RBI®

Infinite ENERGY

High Efficiency Condensing Stainless Steel Gas Hot Water Supply Boiler

Models IEW-199, IEW-399

Boiler manual

Installation and operation instructions

ENERGY STAR

CONTROLS

C US

C US LISTED

Intertek

RBI®

260 North Elm Street
Westfield, MA 01085
Tel: (413) 568-9571
Fax: (413) 568-9613

7555 Tranmere Drive
Mississauga, ONT. L5S IL4 Canada
Tel: (905) 670-5888
Fax: (905) 670-5782

A MESTEK COMPANY

www.rbiwaterheaters.com

TABLE OF CONTENTS

USING THIS MANUAL

A. INSTALLATION SEQUENCE

Follow the installation instructions provided in this manual in the order shown. The order of these instructions has been set in order to provide the installer with a logical sequence of steps that will minimize potential interferences and maximize safety during boiler installation.

B. SPECIAL ATTENTION BOXES

Throughout this manual special attention boxes are provided to supplement the instructions and make special notice of potential hazards. The definition of each of these categories, in the judgement of RBI, Inc. are as follows:

⚠ DANGER

Indicates a condition or hazard which will cause severe personal injury, death or major property damage.

⚠ WARNING

Indicates a condition or hazard which may cause severe personal injury, death or major property damage.

⚠ CAUTION

Indicates a condition or hazard which will or can cause minor personal injury or property damage.

⚠ NOTICE

Indicates special attention is needed, but not directly related to potential personal injury or property damage.

1. PREINSTALLATION

A. GENERAL

1. Infinite Energy boilers are supplied completely assembled as packaged boilers. The package should be inspected for damage upon receipt and any damage to the unit should be reported to the shipping company and wholesaler. This boiler should be stored in a clean, dry area.

2. Carefully read these instructions and be sure to understand the function of all connections prior to beginning installation. Contact your RBI Representative for help in answering questions.

3. This boiler must be installed by a qualified contractor. The boiler warranty may be voided if the boiler is not installed correctly.

B. CODES & REGULATIONS

1. Installation and repairs are to be performed in strict accordance with the requirements of state and local regulating agencies and codes dealing with boiler and gas appliance installation.

2. In the absence of local requirements the following should be followed:
   a. ASME Boiler and Pressure Vessel Code, Section IV - "Heating Boilers"

   b. ASME Boiler and Pressure Vessel Code, Section VI - "Recommended Rules for the Care and Operation of Heating Boilers"

⚠ WARNING

Liquefied Petroleum (LP) Gas or Propane is heavier than air and, in the event of a leak, may collect in low areas such as basements or floor drains. The gas may then ignite resulting in a fire or explosion.

   c. ANSI Z223.1/NFPA 54 - "*National Fuel Gas Code*"

   d. ANSI/NFPA 70 - "*National Electrical Code*"

   e. ANSI/NFPA 211 - "Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances"

3. Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1.

****Please read if installing in Massachusetts****

Massachusetts requires manufacturers of Side Wall Vented boilers to provide the following information from the Massachusetts code:

- A hard wired carbon monoxide detector with an alarm and battery back-up must be installed on the floor level where the gas equipment is to be installed AND on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment.
- In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.
- Detector(s) must be installed by qualified licensed professionals.
- APPROVED CARBON MONOXIDE DETECTORS: Each carbon monoxide detector shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
- SIGNAGE: A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, **"GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS"**.
- EXEMPTIONS to the requirements listed above:
  - The above requirements do not apply if the exhaust vent termination is seven (7) feet or more above finished grade in the area of the venting, including but not limited to decks and porches.
  - The above requirements do not apply to a boiler installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.
- This boiler installation manual shall remain with the boiler at the completion of the installation.

See the latest edition of Massachusetts Code 248 CMR for complete verbiage and also for additional (non-vent related) requirements (248 CMR is available online).

If your installation is NOT in Massachusetts, please see your authority of jurisdiction for requirements that may be in effect in your area. In the absence of such requirements, follow the *National Fuel Gas Code*, ANSI Z223.1/NFPA 54 and/or CAN/CSA B149.1, *Natural Gas and Propane Installation Code*.

C. ACCESSIBILITY CLEARANCES

1. The Infinite Energy boiler is certified for closet installations with zero clearance to combustible construction. In addition, it is design certified for use on combustible floors.

2. Figure 1.1 shows the minimum recommended clearances to allow reasonable access to the boiler for Models IEW-199 and IEW-399. However, local codes or special conditions may require greater clearances.

D. COMBUSTION AND VENTILATION AIR

1. The Infinite Energy boiler is designed for operation with combustion air piped directly to the boiler from outside the building (sealed combustion). If the boiler is vented vertically, the combustion air can be supplied from within the building only if adequate combustion air and ventilation air is provided in accordance with the section of the *National Fuel Gas Code* entitled, "Air for Combustion and Ventilation" or applicable provisions of the local building code. Subsections 3 through 10 as follows are based on the *National Fuel Gas Code* requirements.

2. If the combustion air is piped directly to the boiler from outside the building, no additional combustion or ventilation air is required. Otherwise, follow the *National Fuel Gas Code* recommendations summarized in subsections 3 through 10.

3. *Required Combustion Air Volume*: The total required volume of indoor air is to be the sum of the required volumes for all appliances located within the space. Rooms communicating directly with the space in which the appliances are installed and through combustion air openings sized as indicated in Subsection 3 are considered part of the required volume. The required volume of indoor air is to be determined by one of two methods.
   a. *Standard Method*: The minimum required volume of indoor air (room volume) shall be 50 cubic feet per 1000 BTU/Hr (4.8 m3/kW). This method is to be used if the air infiltration rate is unknown or if the rate of air infiltration is known to be greater than 0.6 air changes per hour. As an option, this method may be used if the air infiltration rate is known to be between 0.6 and 0.4 air changes per hour. If the air infiltration rate is known to be below 0.4 then the *Known Air Infiltration Rate Method* must be used. If the building in which this appliance is to be installed is unusually tight, RBI recommends that the air infiltration rate be determined.
   b. *Known Air Infiltration Rate Method*:

$$\text{Required Volume}_{fan} = \frac{15\ \text{ft}^3}{\text{ACH}} \left(\frac{I_{fan}}{1000^{\text{Btu}/\text{hr}}} \right)$$

where:
I_{fan} = Input of the fan assisted appliances assisted in Btu/hr
ACH = air change per hour (percent of the volume of the space exchanged per hour, expressed as a decimal)

Note: These calculations are not to be used for infiltration rates greater than 0.60 ACH.

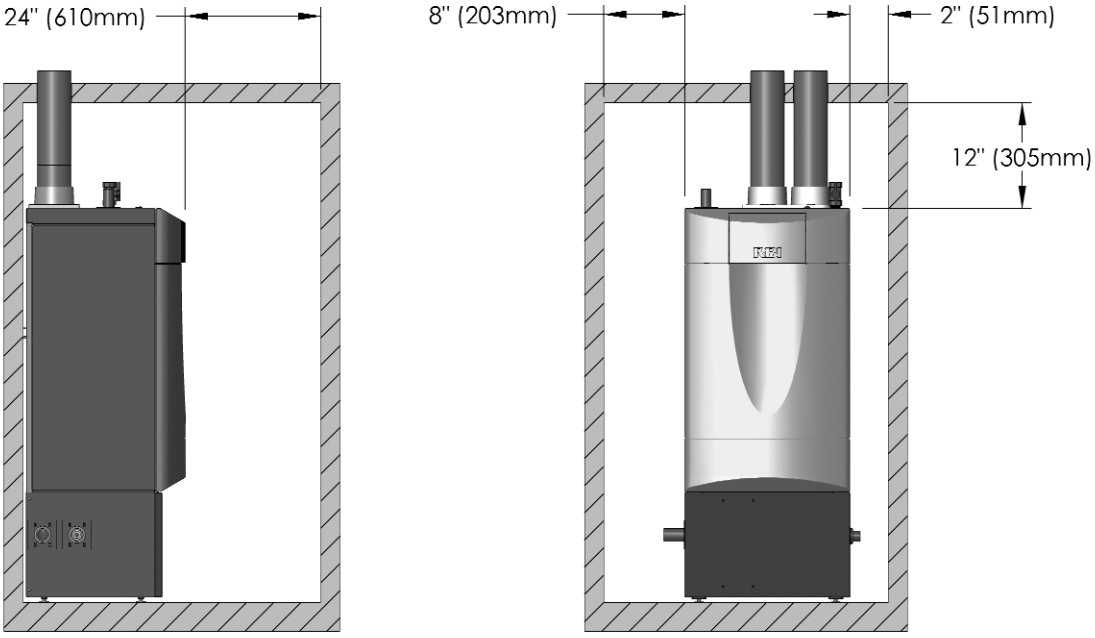


Figure 1.1: Minimum Accessibility Clearances – IEW-199 & IEW-399

4. *Indoor Air Opening Size and Location*: Openings connecting indoor spaces shall be sized and located as follows:
   a. *Combining Spaces on the Same Floor*: Provide two permanent openings communicating with additional spaces that have a minimum free area of 1 in^2 per 1000 Btu/hr (22 cm^2 per 1000 W) of the total input rating of all gas fired equipment but not less than 100 in^2 (645 cm^2). One opening is to begin within 12 inches (305 mm) from the top of the space and the other is to begin within 12 inches (305 mm) from the floor. The minimum dimension of either of these openings shall be 3 inches (76 mm), see Figure 1.2 for an illustration of this arrangement.

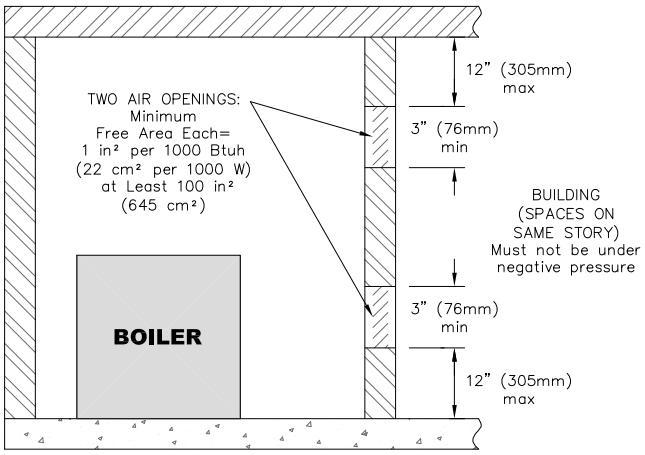


Figure 1.2: Air Openings – All Air from Indoors on the Same Floor

   b. *Combining Spaces on Different Floors*: Provide one or more permanent openings communicating with additional spaces that have a total minimum free area of 2 in^2 per 1000 Btu/hr (44 cm^2 per 1000 W) of total input rating of all equipment, see Figure 1.3 for an illustration of this arrangement.

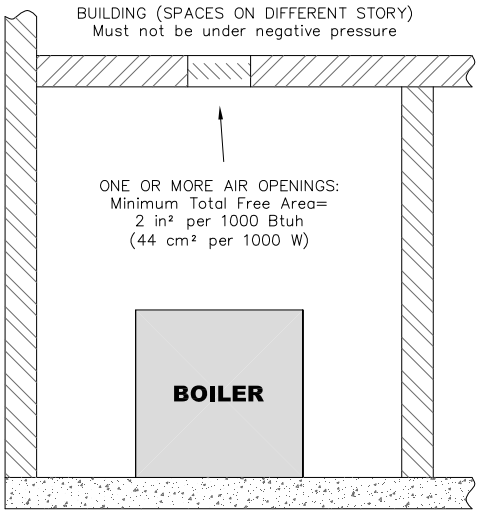


Figure 1.3: Air Openings – All Air from Indoors on Different Floors

5. *Outdoor Combustion Air*: Outdoor combustion air is to be provided through one or two permanent openings. The minimum dimension of these air openings is 3 inches (76 mm).
   a. *Two Permanent Opening Method*: Provide two permanent openings. One opening is to begin within 12 inches (305 mm) of the top of the space and the other is to begin within 12 inches (305 mm) of the floor. The openings are to communicate directly or by ducts with the outdoors or with spaces that freely communicate with the outdoors. The size of the openings shall be determined as follows:
      i. Where communicating directly or through vertical ducts with the outdoors each opening shall have a minimum free area of 1 in2 per 4000 Btu/hr (22 cm^2 per 4000 W) of total input rating for all equipment in the space, see Figure 1.4 for openings directly communicating with the outdoors or Figure 1.5 for openings connected by ducts to the outdoors.

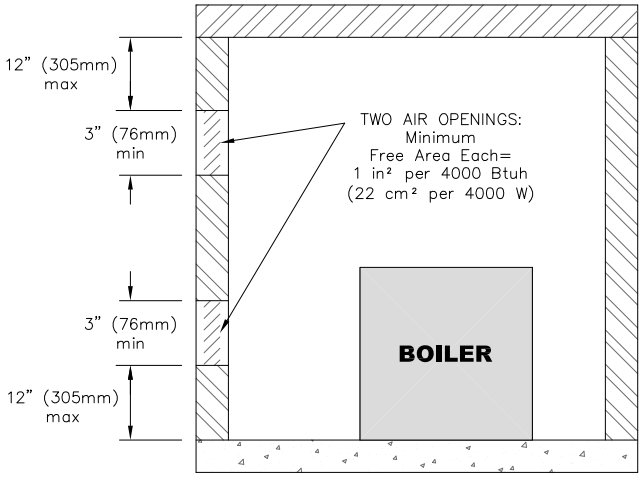


Figure 1.4: Air Openings – All Air Directly from Outdoors

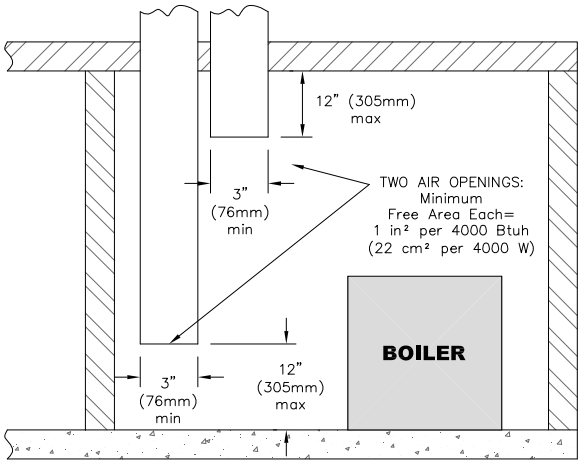


Figure 1.5: Air Openings – All Air from Outdoors through Vertical Ducts

ii. Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 in² per 2000 Btu/hr (22 cm² per 2000 W) of total rated input for all appliances in the space, see Figure 1.6.

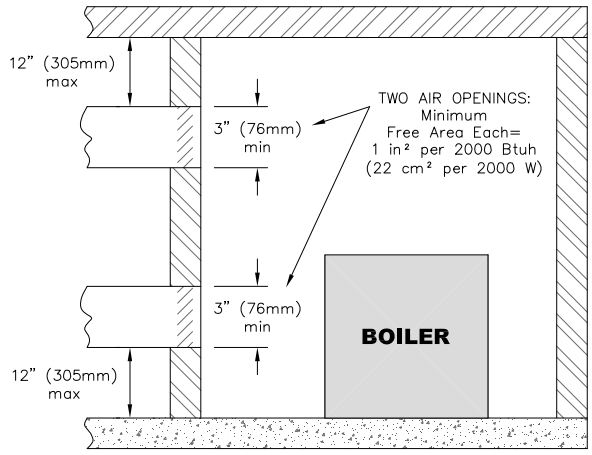


Figure 1.6: Air Openings – All Air from Outdoors through Horizontal Ducts

b. <u>*One Permanent Opening Method*</u>: Provide one permanent opening beginning within 12 inches (305 mm) of the top of the space. The opening shall communicate directly with the outdoors, communicate through a vertical or horizontal duct, or communicate with a space that freely communicates with the outdoors. The opening shall have a minimum free area of 1 in² per 3000 Btu/hr of total rated input for all appliances in the space and not less than the sum of the cross-sectional areas of all vent connectors in the space. The gas-fired equipment shall have clearances of at least 1 inch (25 mm) from the sides and back and 6 inches (150 mm) from the front of the appliance, see Figure 1.7 for this arrangement.

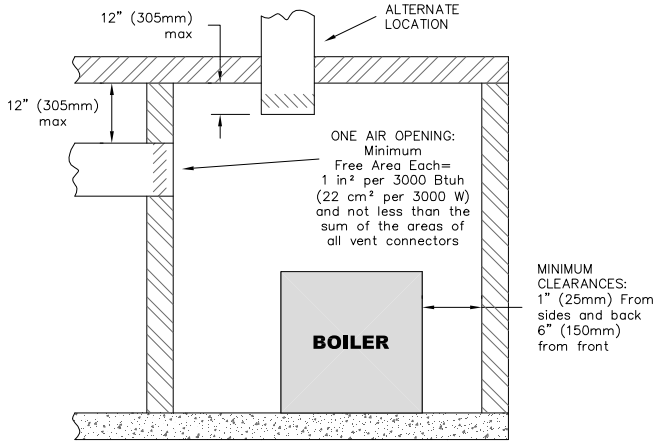


Figure 1.7: Air Openings – All Air from Outdoors through One Opening

6. *Combination Indoor and Outdoor Combustion Air*: If the required volume of indoor air exceeds the available indoor air volume, outdoor air openings or ducts may be used to supplement the available indoor air provided:
   a. The size and location of the indoor openings comply with Subsection 3.
   b. The outdoor openings are to be located in accordance with Subsection 4.
   c. The size of the outdoor openings are to be sized as follows:

      where:
      A_{req} = minimum area of outdoor openings.
      A_{full} = full size of outdoor openings calculated in accordance with Subsection 4.
      V_{avail} = available indoor air volume
      V_{req} = required indoor air volume

7. *Engineered Installations*: Engineered combustion air installations shall provide an adequate supply of combustion, ventilation, and dilution air and shall be approved by the authority having jurisdiction.

8. *Mechanical Combustion Air Supply*:
   a. In installations where all combustion air is provided by a mechanical air supply system, the combustion air shall be supplied from the outdoors at the minimum rate of 0.35 ft³/min per 1000 Btu/hr (0.034 m³/min per 1000 W) of the total rated input of all appliances in the space.
   b. In installations where exhaust fans are installed, additional air shall be provided to replace the exhaust air.
   c. Each of the appliances served shall be interlocked to the mechanical air supply to prevent main burner operation when the mechanical air supply system is not in operation.
   d. In buildings where the combustion air is provided by the mechanical ventilation system, the system shall provide the specified combustion air rate in addition to the required ventilation air.

9. *Louvers & Grills*:
   a. The required size of openings for combustion, ventilation, and dilution air shall be based on the net free area of each opening.
      i. Where the free area through a louver or grille is known, it shall be used in calculating the opening size required to provide the free area specified.
      ii. Where the free area through a louver or grille is not known, it shall be assumed that wooden louvers will have 25% free area and metal louvers and grilles will have 75% free area.
      iii. Non-motorized dampers shall be fixed in the open position.
   b. Motorized dampers shall be interlocked with the equipment so that they are proven in the full open position prior to ignition and during operation of the main burner.

i. The interlock shall prevent the main burner from igniting if the damper fails to open during burner startup.

ii. The interlock shall shut down the burner if the damper closes during burner operation.

10. *Combustion Air Ducts*:
    a. Ducts shall be constructed of galvanized steel or an equivalent corrosion-resistant material.
    b. Ducts shall terminate in an unobstructed space, allowing free movement of combustion air to the appliances.
    c. Ducts shall serve a single space.
    d. Ducts shall not serve both upper and lower combustion air openings where both such openings are used. The separation between ducts serving upper and lower combustion air openings shall be maintained to the source of combustion air.
    e. Ducts shall not be screened where terminating in an attic space.
    f. Horizontal upper combustion air ducts shall not slope downward toward the source of the combustion air.
    g. The remaining space surrounding a chimney liner, gas vent, special gas vent, or plastic piping installed within a masonry, metal, or factory built chimney shall not be used to supply combustion air unless it is directly piped to the air inlet as shown in Figure 3.9.
    h. Combustion air intake openings located on the exterior of buildings shall have the lowest side of the combustion air intake opening at least 12 inches (305 mm) above grade.

11. Refer to Section 3 of this manual, Venting & Air Inlet Piping, for specific instructions for piping the exhaust and combustion air.

E. PLANNING THE LAYOUT

1. Prepare sketches and notes showing the layout of the boiler installation to minimize the possibility of interferences with new or existing equipment, piping, venting and wiring.

2. The following sections of this manual should be reviewed for consideration of limitations with respect to:
    a. Venting and Air Inlet Piping: Section 3
    b. Water Piping: Section 4
    c. Fuel Piping: Section 5
    d. Condensate Removal: Section 6
    e. Electrical Connections: Section 7
    f. Boiler Control: Section 8
    g. Boiler Dimensions and Ratings: Section 12

⚠ WARNING

This boiler is certified as an indoor appliance. Do not install this boiler outdoors or locate where it will be exposed to freezing temperatures.

⚠ WARNING

Do not install this boiler where gasoline or other flammable liquids or vapors are stored or are in use.

⚠ WARNING

Do not install this boiler in the attic.

2. BOILER SET-UP

A. GENERAL

1. Infinite Energy boilers are intended for installation in an area with a floor drain or in a suitable drain pan. Do not install any boiler where leaks or relief valve discharge will cause property damage.
2. The Infinite Energy boiler is not intended to support external piping. All venting and other piping should be supported independently of the boiler.
3. Install the boiler level to prevent condensate from backing up inside the boiler.

⚠ CAUTION

This boiler must be installed level to prevent condensate from backing up inside the boiler.

B. FLOOR STANDING INSTALLATION

1. For floor standing installations, use the leveling feet to assure that the boiler is completely level. This will prevent condensate from backing up in the boiler.
2. Be sure to leave adequate space for condensate piping or a pump if required.

3. VENTING & AIR INLET PIPING

A. GENERAL

1. Install the Infinite Energy boiler venting system in accordance with these instructions and with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*, *CAN/CGA B149*, and/or applicable provisions of local building codes.

2. The Infinite Energy boiler is a direct vent appliance and is ETL Listed as a Category IV appliance with Intertek Testing Laboratories, Inc.

⚠ WARNING

The venting system for this product is to be installed in strict accordance with these venting instructions. Failure to install the vent system properly may result in severe personal injury, death or major property damage.

⚠ WARNING

This vent system operates under positive pressure. Vent connectors serving appliances vented by natural draft shall not be connected into any portion of this venting system. Failure to comply may result in serious injury, death or major property damage.

B. APPROVED MATERIALS

1. Table 3.1 lists approved materials for vent pipe (and adhesives where applicable). Use only these materials for exhaust vent piping.

2. PVC pipe and fittings are not to be used for venting in confined spaces such as closet installations. Use only CPVC vent pipe under these conditions.

3. Cellular core piping is approved for inlet air piping only.

⚠ WARNING

Only the materials listed below are approved for use with the Infinite Energy boiler. Use only these components in accordance with these instructions. Failure to use the correct material may result in serious injury, death, or major property damage.

Table 3.1: Approved Materials for Exhaust Vent Pipe

Description	Material	Conforming to Standard
Vent Piping & Fittings	PVC (Sch 40 or 80)*	ANSI/ASTM D1785
	CPVC (Sch 40 or 80)	ANSI/ASTM D1785
	PVC-DWV*	ANSI/ASTM D2665
	MUGRO™ PP(s)	ULC-S636
	InnoFlue® PP	ULC-S636
Pipe Cement (PVC & CPVC Only)	PVC/CPVC Cement	ANSI/ASTM D2564

* PVC pipe fittings are not to be used for venting within confined spaces.

Notice: Installations in Canada require compliance with ULC S636 – Standard for Type BH Gas Venting Systems.

⚠ WARNING

Use of cellular core pipe for any exhaust vent component is prohibited. Use of cellular core pipe may result in severe personal injury, death, or major property damage.

C. EXHAUST VENT/AIR INTAKE PIPE LOCATION

1. Install vent piping before installing water, fuel, or condensate piping. Working from largest to smallest diameter reduces the complexity of piping interferences.

2. Vent and air intake piping is to be installed so that there is sufficient access for routine inspection as required in Section 11 of this manual.

3. The vent piping for this boiler is approved for zero clearance to combustible construction. However, a fire stop must be used where the vent pipe penetrates walls or ceilings.

4. The Infinite Energy boiler, like all high efficiency, gas-fired appliances, is likely to produce a vapor plume due to condensation. Surfaces near the vent termination will likely become coated with condensation.

5. The maximum combined vent and air inlet vent length for the Infinite Energy boiler is about 200 equivalent feet (60 m). Be sure that the boiler is located such that the maximum vent length is not exceeded.

⚠ NOTICE

If the maximum equivalent vent length is exceeded, the maximum burner input rate may be reduced.

6. Air Intake Pipe Location – Sidewall Venting:
   a. Provide 1 foot (30 cm) clearance from the bottom of the air intake pipe to the level of maximum snow accumulation. Snow removal may be necessary to maintain clearances.
   b. Do not locate air intake pipe in a parking area where machinery may damage the pipe.
   c. The maximum distance between the air intake and exhaust is 6 feet (1.8 m).

⚠ NOTICE

Locating air intake and exhaust pipes on different sides of a building can cause erratic operation due to wind gusts. When using the sidewall venting configuration always locate both terminations on the same outside wall.

d. If the vent pipe and air inlet pipe terminations penetrate the wall at the same level the minimum distance between them is 8" center-to-center.

e. For multiple boiler installations, the minimum horizontal distance between the inlet of one boiler to the exhaust of an adjacent boiler is 8" center-to-center. In addition, the minimum vertical distance between the exhaust and air inlet is 6", see Figure 3.1 for an illustration.

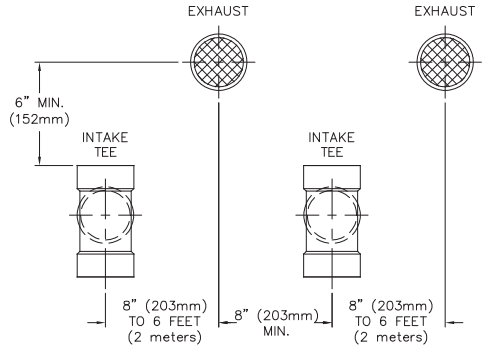


Figure 3.1: Vent Pipe Spacing for Multiple Infinite Energy Boilers

f. The exhaust outlet of the vent pipe should not be angled any more than 5° from horizontal.

g. Precautions should be taken to prevent recirculation of flue gases to the air inlet pipe of the boiler or other adjacent appliances.

7. Sidewall Venting Configuration:

a. See Figure 3.2 for an illustration of clearances for location of exit terminals of direct-vent venting systems.

- This boiler vent system shall terminate at least 3 feet (0.9 m) above any forced air inlet located within 10 ft (3 m). Note: This does not apply to the combustion air intake of a direct-vent appliance.
- Provide a minimum of 1 foot (30 cm) distance from any door, operable window, or gravity intake into any building.
- Provide a minimum of 1 foot (30 cm) clearance from the bottom of the exit terminal above the expected snow accumulation level. Snow removal may be required to maintain clearance.
- Provide a minimum of 4 feet (1.22 m) horizontal clearance from electrical meters, gas meters, gas regulators, and relief equipment. In no case shall the exit terminal be above or below the aforementioned equipment unless the 4 foot horizontal distance is maintained.
- Do not locate the exhaust exit terminal over public walkways where condensate could drip and create a hazard or nuisance.
- When adjacent to public walkways, locate the exit terminal at least 7 feet above grade.
- Do not locate the exhaust termination directly under roof overhangs to prevent icicles from forming or recirculation of exhaust gases from occurring.

⚠ CAUTION

Condensing flue gases can freeze on exterior building surfaces which may cause discoloration and degradation of the surfaces.

- Provide 3 feet clearance from the inside corner of adjacent walls.

b. Figure 3.3 and 3.4 show approved sidewall venting configurations using the standard fittings supplied.

c. Figure 3.4 is only approved for locations in which the outdoor temperature is above -5°F (-21°C) in accordance with ASHRAE 90A-1980 recommendations.

d. Figures 3.5 and 3.6 show approved sidewall vent configurations using optional vent termination kits.

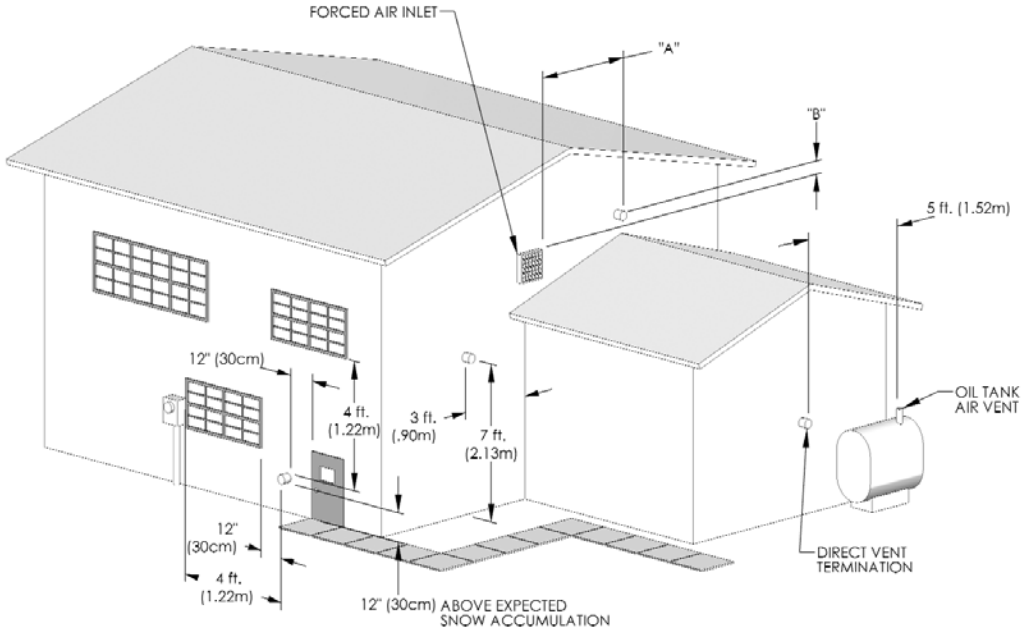


Figure 3.2: Exit Terminal Location for Mechanical Draft and Direct-Vent Venting Systems

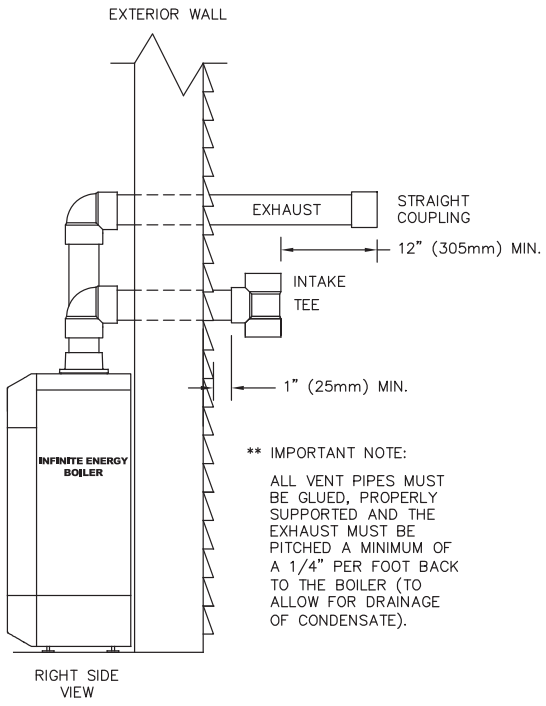


Figure 3.3: Standard Exhaust and Air Inlet Pipe Penetrations

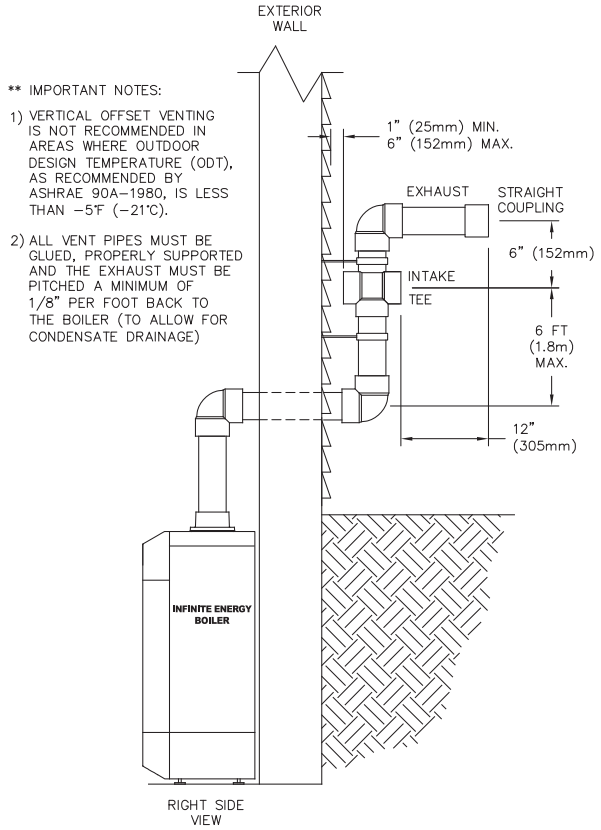


Figure 3.4: Offset Exhaust and Air Inlet Terminations

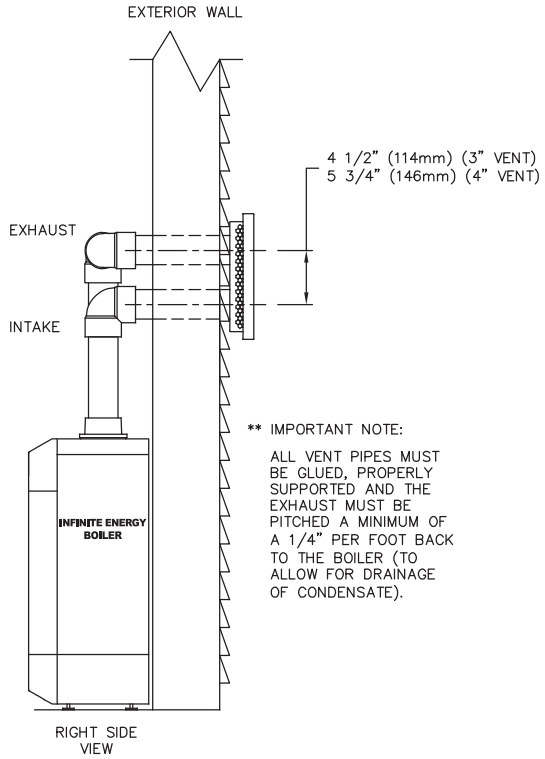


Figure 3.5: Optional Stainless Steel Vent Kit Installation

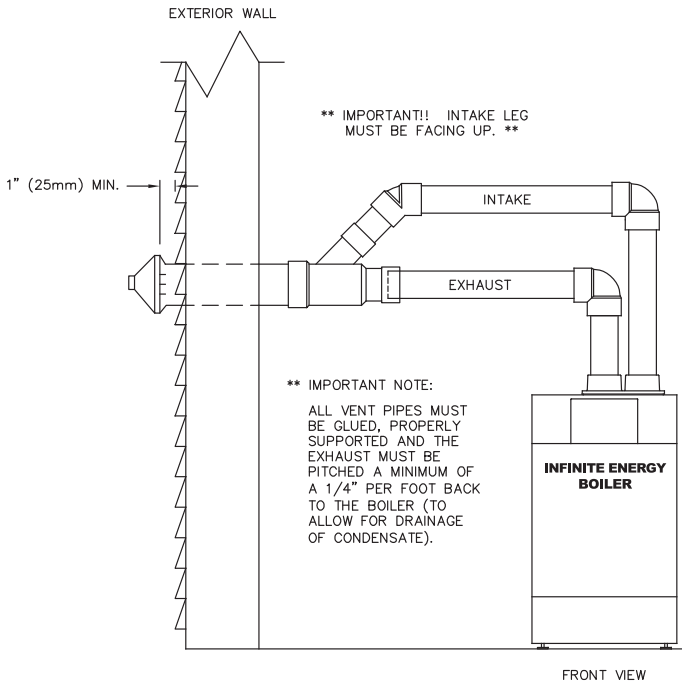


Figure 3.6: Optional Concentric PVC Vent Kit Installation

8. Vertical Venting Configuration:
   a. Figure 3.7 shows the approved venting configuration for vertical venting using the standard fittings supplied.

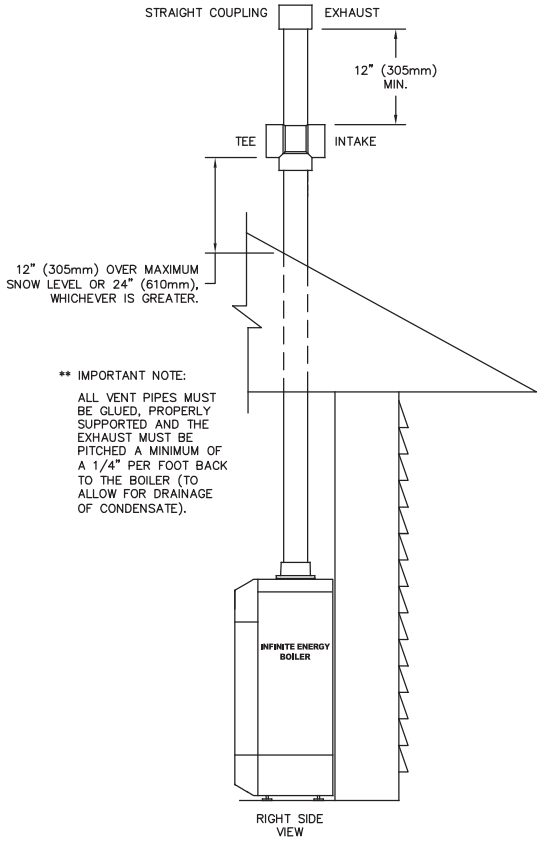


Figure 3.7: Standard Vertical Vent Installation

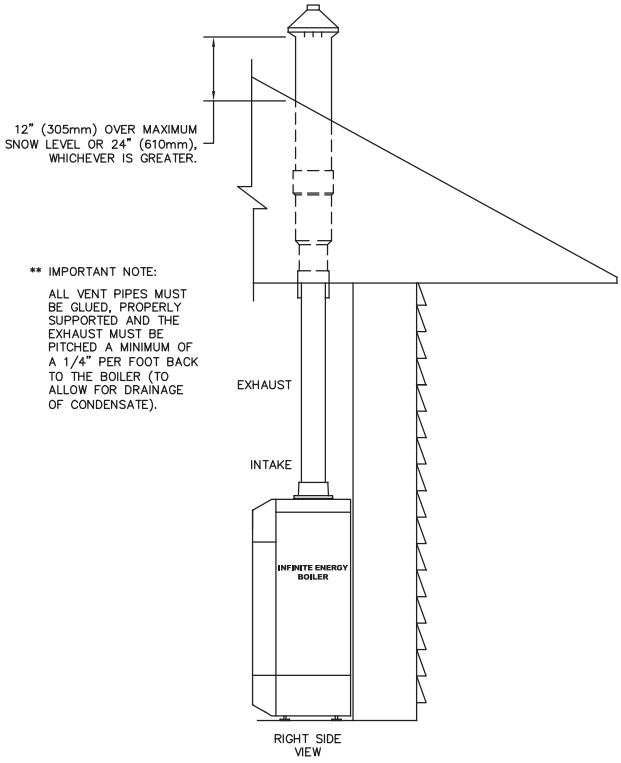


Figure 3.8: Concentric PVC Vertical Vent Installation

   b. Locate the air intake pipe inlet 12" above the expected snow accumulation on the roof surface or 24" above the roof surface, whichever is greater.
   c. Locate the end of the exhaust vent pipe a minimum of 12" above the inlet to the air intake pipe.
   d. Figure 3.8 shows an approved vertical vent configuration using the optional concentric vent termination kit.
   e. Figure 3.9 shows an option for routing the exhaust through an unused chimney while bringing combustion air from the space surrounding the vent pipe.
   f. Figure 3.9 shows an option for routing the exhaust through an unused chimney with the combustion air supplied from inside the building. Be sure to note the requirements for combustion air as listed under Section 1.D. "Combustion and Ventilation Air". These requirements are in accordance with the *National Fuel Gas Code*.

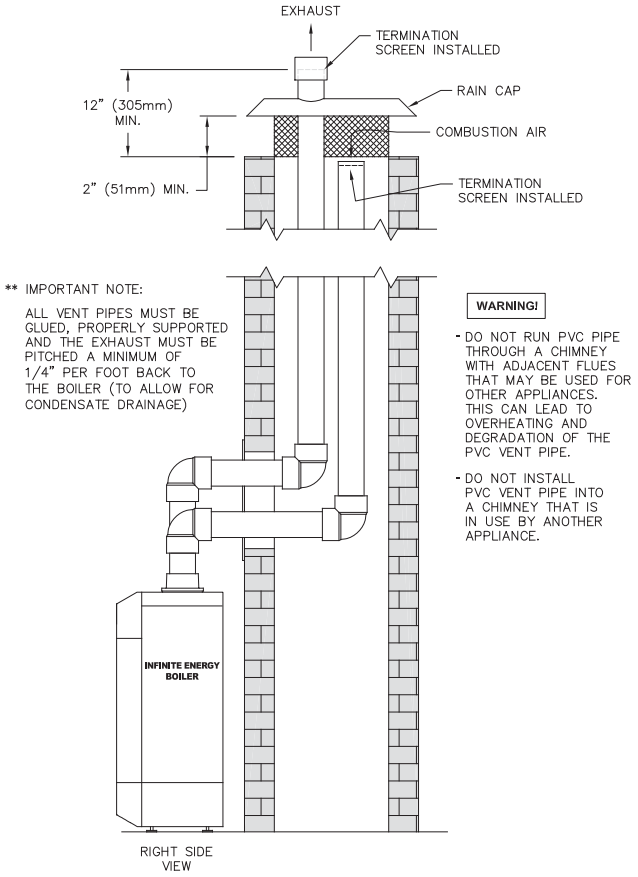


Figure 3.9

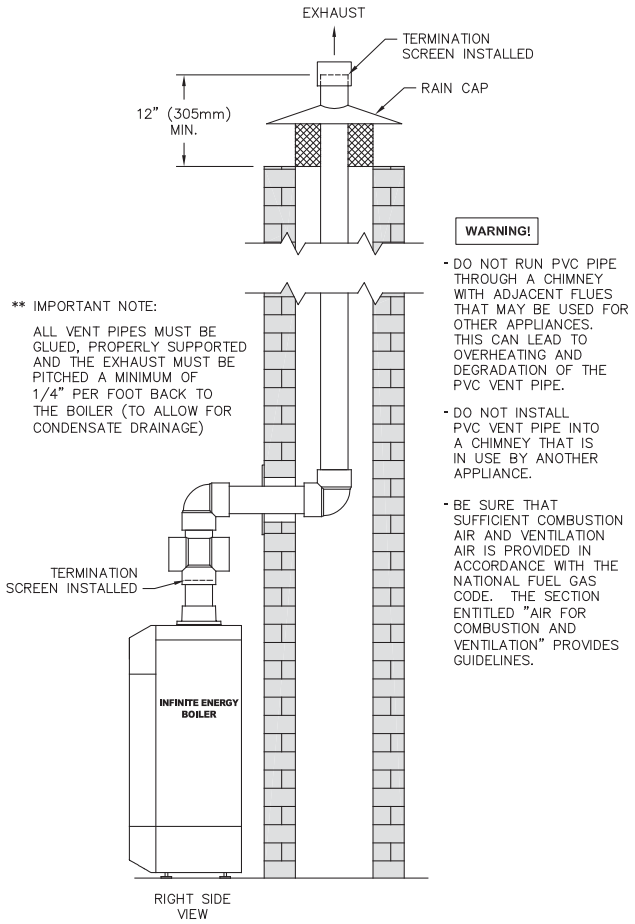


Figure 3.10

D. EXHAUST VENT/AIR INTAKE PIPE SIZING

1. Infinite Energy boiler model IEW-199 to be installed using 3" Schedule 40 or 80 PVC or CPVC piping using the provided vent adapter. Infinite Energy model IEW-399 boilers are to be installed using 4" Schedule 40 or 80 PVC or CPVC piping using the vent adapter provided.

2. Concentric polypropylene venting systems can be installed using optional vent adapters. Table 3.2 shows the appropriate Stock Codes.

Table 3.2: Stock Codes

Boiler Model	Stock Code
IEW-199	3354236
IEW-399	3354237

Contact your RBI Representative for more information on this option.

3. The total combined length of exhaust vent and air intake piping is 200 equivalent feet (60 m).
   a. The equivalent length of elbows, tees and other fittings are listed in Table 3.3.

Table 3.3: Equivalent Length of Fittings

Fitting Description	Equivalent Length
Elbow, 90° Short Radius	5 feet
Elbow, 90° Long Radius	4 feet
Elbow, 45° Short Radius	3 feet
Coupling	0 feet
Air Intake Tee	0 feet
Stainless Steel Vent Kit	1 foot
Concentric Vent Kit	3 feet

   b. The equivalent length can be calculated as follows.

Table 3.4: Sample Equivalent Length Calculation

	Exhaust	Air Inlet	Total
Straight Length of Pipe	50'	50'	100'
90° Elbows, SR	2 x 5'= 10'	1 x 5' = 5'	15'
45° Elbows, SR		2 x 3' = 6'	6'
Conc. Vent Termination	1 x 3' = 3'		3'
	Total		124'

This is well below the 200 feet maximum equivalent length. If the total is above 200 equivalent feet, alternate boiler locations or exhaust penetration location should be considered.

E. EXHAUST VENT/AIR INTAKE INSTALLATION

1. Figure 12.1 shows the exhaust connection on top of the boiler, near the rear in the center.
   a. The exhaust connections for the IEW-199 (3") and IEW-399 (4") are male CPVC pipe.
   b. These connections are to be joined with suitable PVC/CPVC adhesives in accordance with manufacturers' instructions.

2. The Air Intake connection is to the right of the exhaust.

3. Both connections are clearly marked.

4. Remove all burrs and debris from the joints and fittings.

⚠ WARNING

This appliance uses a positive pressure venting system. All joints must be sealed completely to prevent leakage of flue products into living spaces. Failure to do this may result in severe personal injury, death or major property damage.

5. Horizontal lengths of exhaust vent must be installed with a slope of not less than 1/4" per foot (21 mm per meter) toward the boiler to allow condensate to drain from the vent pipe. If the vent pipe must be piped around an obstacle that causes a low point in the piping, a drain with an appropriate trap must be installed.

6. All piping must be fully supported. Use pipe hangers at a minimum of 4 foot (1.22 meter) intervals to prevent sagging of the pipe.

7. Exhaust and air inlet piping is to be supported separately and should not apply force to the boiler.

8. Penetration openings around the vent pipe and air intake piping are to be fully sealed to prevent exhaust gases from entering building structures.

9. PVC & CPVC Piping:
   a. Use only solid PVC or CPVC Schedule 40 or 80 pipe for exhaust venting. Cellular core PVC or CPVC is not approved for exhaust vent.
   b. All joints in vent pipe, fittings, attachment to the boiler stub, and all vent termination joints must be properly cleaned, primed and cemented. Use only cement and primer approved for use with PVC or CPVC pipe that conforms to ANSI/ASTM D2564.
   c. A straight coupling is provided with the boiler to be used as an outside vent termination. One of the two screens is to be installed to prevent birds or rodents from entering.
   d. An air intake tee is provided with the boiler to be used as an outside air intake termination. A screen is to be installed to prevent birds or rodents from entering.
   e. The following are optional combination air intake/exhaust terminations that are available separately from your RBI distributor for use with Infinite Energy boilers.

Table 3.5: Vent Termination Kits

Description	Stock Code
3" PVC Concentric Vent Termination Kit	3391403
3" Stainless Steel Vent Termination Kit	3354161

   f. Refer to Figures 3.3 to 3.6 for sidewall venting options using PVC or CPVC pipe.
   g. Refer to Figures 3.7 & 3.8 for vertical venting options using PVC or CPVC pipe.

F. EXHAUST TAPPING FOR VENT SAMPLE

To properly install the boiler, carbon dioxide (CO_2) and carbon monoxide (CO) readings are to be determined from a sample of combustion gases from the vent pipe.

To do this, a hole must be drilled in the vent pipe.

a. Drill a 21/64" diameter hole in the exhaust vent pipe at a point between 6" and 12" from the boiler connection.
b. Tap the hole with a 1/8" NPT pipe tap.
c. Use a 1/8" NPT, PVC or Teflon Pipe Plug to seal the hole.

See Section 9.D.7 for instructions on taking combustion readings.

G. BOILER REMOVAL FROM COMMON VENTING SYSTEM

If removing an existing boiler from a common vent system the following steps must be carried out for each appliance that remains connected. These steps are to be completed for each appliance while the other appliances that remain connected are not in operation.

a. Seal any unused openings in the common venting system.
b. Visually inspect the venting system for proper size and horizontal pitch. Verify that there is no blockage or restriction, leakage, corrosion, and other deficiencies which could cause an unsafe condition.
c. Where practical, close all building doors and windows. This includes interior doors between the space in which the appliances remaining connected to the common venting system are located and other interior spaces in the building.
d. Turn on clothes dryers and any other appliance not connected to the common venting system. Exhaust fans such as range hoods or bathroom exhaust fans are to be operated at their maximum speed (do not operate a summer exhaust fan).
e. Close fireplace dampers.
f. Place the appliance that is being inspected in operation. Follow the lighting instructions and adjust the thermostat so that the appliance will operate continuously.
g. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame from a match or candle, or smoke from a cigarette, cigar, or pipe.
h. After each appliance remaining connected to the common vent system has been determined to vent properly as outlined above, doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance are to be returned to their previous condition of use.
i. Any improper operation of the common venting system should be corrected at once so that the installation conforms with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* and/or *CAN/CGA B149 Natural Gas and Propane Installation Code*.
j. When resizing any portion of the common venting system, the system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the *National Fuel Gas Code, ANSI Z223.1/NFPA 54* and or *CAN/CSA B149.1, Natural Gas and Propane Installation Code*.

4. WATER PIPING & CONTROLS

A. GENERAL

1. Size water supply and return piping in accordance with system requirements. Do not use smaller diameter piping than the boiler connections.

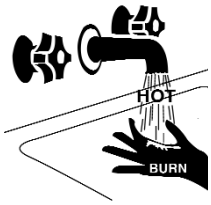
2. If the Infinite Energy boiler is used to replace an existing boiler, make sure that the system piping is thoroughly cleaned and free from debris before installation.

3. In systems where sediment may exist, install a strainer in the boiler return piping to prevent large particles and pipe scale from entering the boiler heat exchanger. Use a large mesh screen in the strainer.

4. Install this boiler so that the gas ignition system components are protected from water (dripping, spraying, etc.) during operation and service (pump replacement, condensate trap cleaning, sensor replacement, etc.).

5. The Infinite Energy boiler is supplied with a default tank temperature setpoint of 120°F (49°C). However, the setpoint can be set as high as 158°F (70°C) which can potentially cause scald injury. If the tank temperature is set to above 120°F (49°C), RBI recommends the use of a mixing valve to provide lower temperature water to faucets and shower heads.

⚠ DANGER



Water temperatures over 125°F (52°C) can cause severe burns instantly, or death from scalds.

Children, disabled, and elderly are at the highest risk of being scalded.

See instruction manual before setting temperature at water heater.

Feel water before bathing or showering.

Temperature limiting valves are available, see manual.

B. OPERATING PARAMETERS

1. The Infinite Energy boiler is designed to operate in an open loop domestic water heating system under forced circulation with a water storage tank. The system must be completely filled with water at all times and water must be circulating through the boiler while the unit is firing for it to operate effectively.

2. The minimum system pressure is 14.5 PSI (69 kPa).

3. Table 4.1 lists the minimum flow rates for each Infinite Energy model.

Table 4.1: Minimum Flow Rate

Infinite Energy Model	Minimum Flow Rate Water GPM (LPM)
IEW-199	5.5 (20.8)
IEW-399	13.2 (50.0)

4. Table 4.2 provides the water volume of the heat exchanger including the supply and return pipes that are attached at the factory.

Table 4.2: Heat Exchanger Water Capacity

Infinite Energy Model	Total Water Capacity Gallons (Liters)
IEW-199	1.19 (4.50)
IEW-399	2.60 (9.84)

⚠ NOTICE

Water temperature rise and maximum flow data is based on heating potable water with a hardness of 5 to 25 grains per gallon and total dissolved solids not exceeding 350 ppm.

5. The required temperature rise and the standard circulating pump are sized based on the heating of potable water with a hardness of 5 to 25 grains per gallon and a total dissolved solids not exceeding 350 ppm. Consult the manufacturer when heating potable water exceeding these specifications.

   Heating of high hardness and/or high total dissolved solids water may require a larger circulating pump, and a revised temperature rise specification based on the water chemistry of the water to be heated.

   Water with a hardness of less than 5 grains per gallon will usually have a pH which can be aggressive and corrosive causing non-warrantable damage to the pump, and associated piping. Corrosion due to water chemistry generally shows up first in the hot water system because heated water increases the rate of corrosive chemical reactions.

C. SYSTEM COMPONENTS

1. *Pressure/Temperature Gauge*: A combination pressure/temperature gauge is provided with each boiler to be mounted in the piping from the boiler supply to the system as shown in Figure 4.1. Most local codes require this gauge.

2. *Potable Water Expansion Tank*: An expansion tank is required to provide room for expansion of the heating medium (water or glycol solution). Consult the expansion tank manufacturer's instructions for specific information regarding installation. The expansion tank is to be sized for the required system volume and capacity. In addition, be sure that the expansion tank is sized based on the proper heating medium. Glycol solutions may expand more than water for a similar temperature rise.

3. *Y-Type Strainer or Filter Ball® Valve*: RBI recommends the use of a strainer device in the system to prevent dirt or sediment from clogging the heat exchanger. A 20 mesh stainless steel screen is adequate to protect the heat exchanger. The strainer should be cleaned often in the first several months of operation. The Filter Ball® Valve from Jomar International incorporates a strainer into a ball valve which allows the technician to isolate the water circuit while cleaning the strainer.

4. *Back Flow Preventer*: A back flow preventer (check valve) is required by some jurisdictions to prevent water in the system from backing up into the city water supply.

5. *Pressure Relief Valve*: The boiler pressure relief valve is shipped separately for field installation. It is extremely important that this is installed on the boiler return pipe (at the rear of the boiler).

⚠ WARNING

Do not operate this appliance without installing the pressure relief valve supplied with the boiler or one with sufficient relieving capacity in accordance with the ASME Rating Plate on the boiler heat exchanger.

The valve is to be installed as shown in Figure 4.1 Pipe the discharge of the relief valve to within 12" (305 mm) of the floor and close to a floor drain.

⚠ CAUTION

Pipe the discharge of the relief valve as close as possible to the floor and away from high traffic areas. Pipe the discharge to a floor drain. Failure to do so may result in personal injury and/or property damage.

Provide piping that is the same size or larger than the relief valve outlet.

6. *Pump*: The boiler pump is to be sized to overcome the pressure drop of the system while providing the flow required by the boiler.
   a. The pump should be sized based on gross output of the boiler. Table 4.3 shows the Boiler Output as reported to the Hydronics Institute Section of AHRI.

Table 4.3: Boiler Inputs and Outputs

Infinite Energy Model	Boiler Input Btu/hr (kW)	Gross Output Btu/hr (kW)
IEW-199	199,000 (58.3)	182,000 (53.3)
IEW-399	399,000 (116.9)	373,000 (109.3)

   b. The required flow is calculated based on the design temperature difference from the return to the supply of the boiler. For a IEW-199 with a design temperature difference of 20°F the calculation is as follows.

$$\text{Required Flow} = \frac{\text{Output}}{\Delta T \times 500} = \frac{182{,}000}{20 \times 500} = 18.2 \text{ GPM}$$

   c. The boiler pressure drop for various flow rates can be determined using Figure 4.2, the Infinite Energy Boiler Pump Sizing Graph.

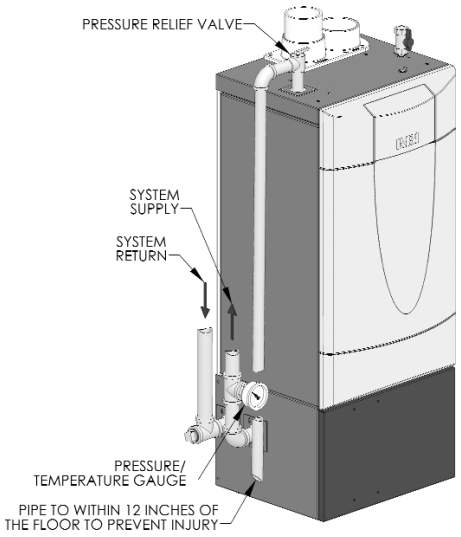


Figure 4.1: Relief Valve Installation

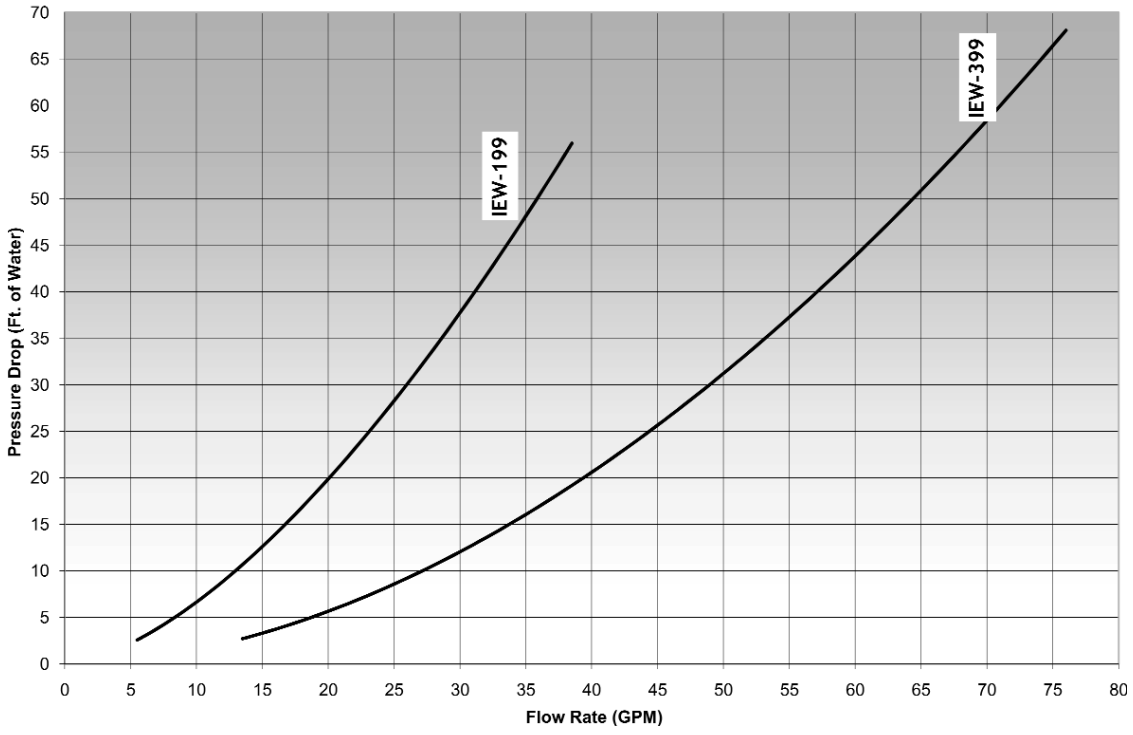


Figure 4.2: Infinite Energy Pump Sizing Graph (General Pump – Primary/Secondary)

d. Table 4.4 provides the flow rate and pressure drop information that corresponds to various system temperature rise values (ΔT). The pressure drop shown is for the boiler only. If there is significant system pressure drop in the system, this should be included when specifying pumps.

Table 4.4: Flow Rate and Pressure Drop for Various System Temperature Rise Values

Temperature Rise / Pressure Drop									
ΔT		IEW-199				IEW-399			
(°F)	(°C)	GPM	*LPM*	Ft	*m*	GPM	*LPM*	Ft	*m*
20	11	18.2	*68.9*	17.12	*5.22*	37.3	*141.2*	18.08	*5.51*

e. Table 4.5 provides a list of recommended pumps for hot water supply boilers.

Table 4.5: Pump Selection Chart (General Pump – Primary/Secondary)

Pump Manufacturer	Temperature Difference	IEW-199	IEW-399
Taco	20°F	1400-20*	1400-50*
Bell & Gossett		PL-36*	PL-55*

* An isolation relay must be used for these circulators and any circulator with a FLA rating above 3 Amps.

D. SYSTEM PIPING

1. Figure 4.3 shows piping for a single boiler with a single storage tank. When using the factory specified pump, the maximum total pipe length is 30 feet (10 meters) with 6 90° elbows all at the full pipe diameter of the pump connections.

2. In Figure 4.4, a single boiler is used with multiple water storage tanks. The pumps are piped in parallel with reverse return piping.

3. Figure 4.5 shows two boilers piped into a single storage tank.

4. Figure 4.6 shows piping for two boilers and two water storage tanks.

5. In Figure 4.7, we show a single boiler with a single tank using a patented anti-scale principle. In this configuration, the boiler control switches the 3-way valve to bypass when the call for heat ends. The pump is then operated to draw cool water from the anti-scale buffer tank until the supply and return temperatures equalize.

6. In Figure 4.8, a plate heat exchanger is used to isolate the boiler from the domestic hot water supply system. This strategy can be used if the domestic water does not meet the water quality guidelines presented earlier in this section. Note that a hydronic thermal expansion tank is required in this closed-loop system.

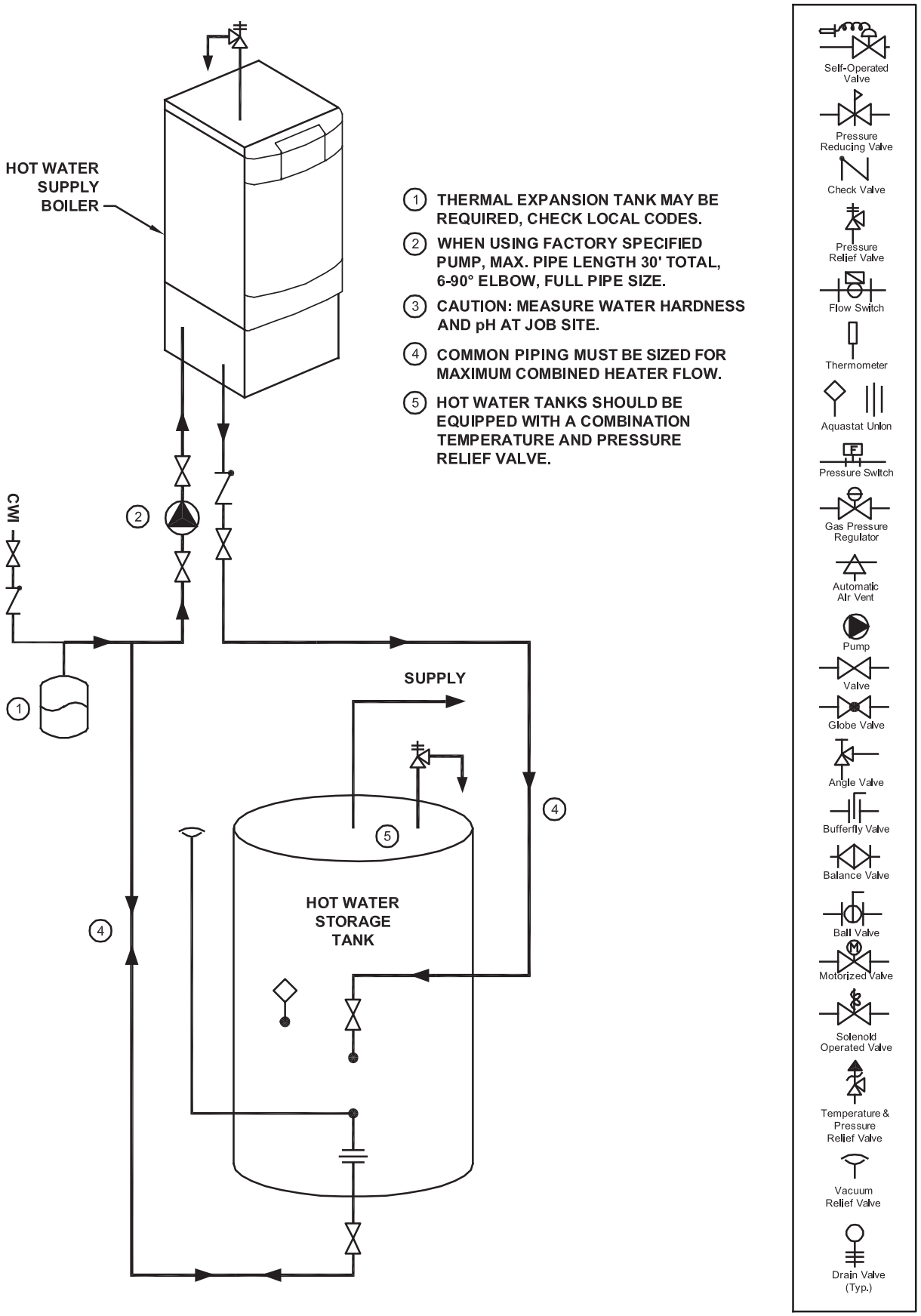


Figure 4.3: Piping – One Boiler with a Single Storage Tank

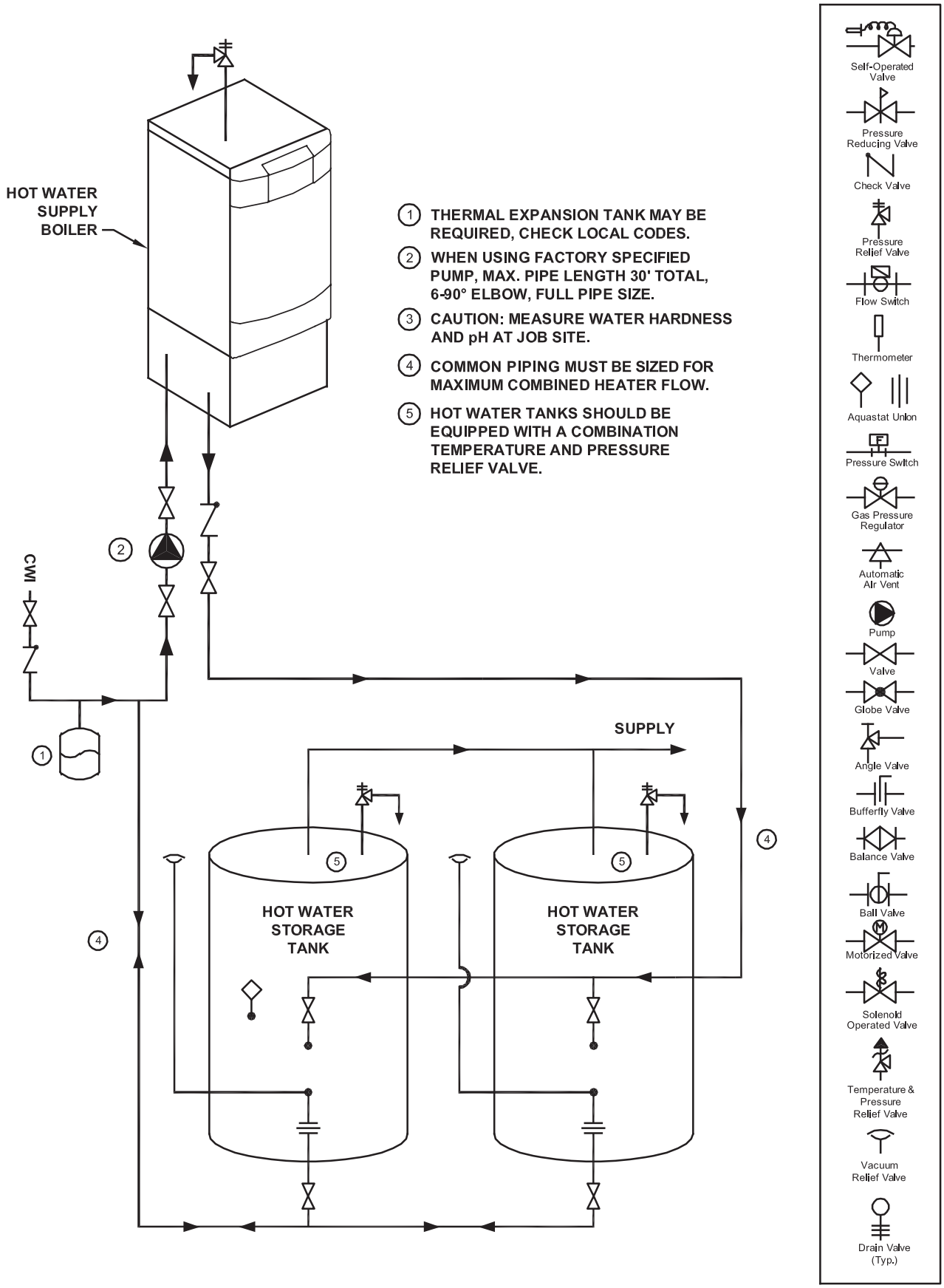


Figure 4.4: Piping – One Boiler with Multiple Storage Tanks

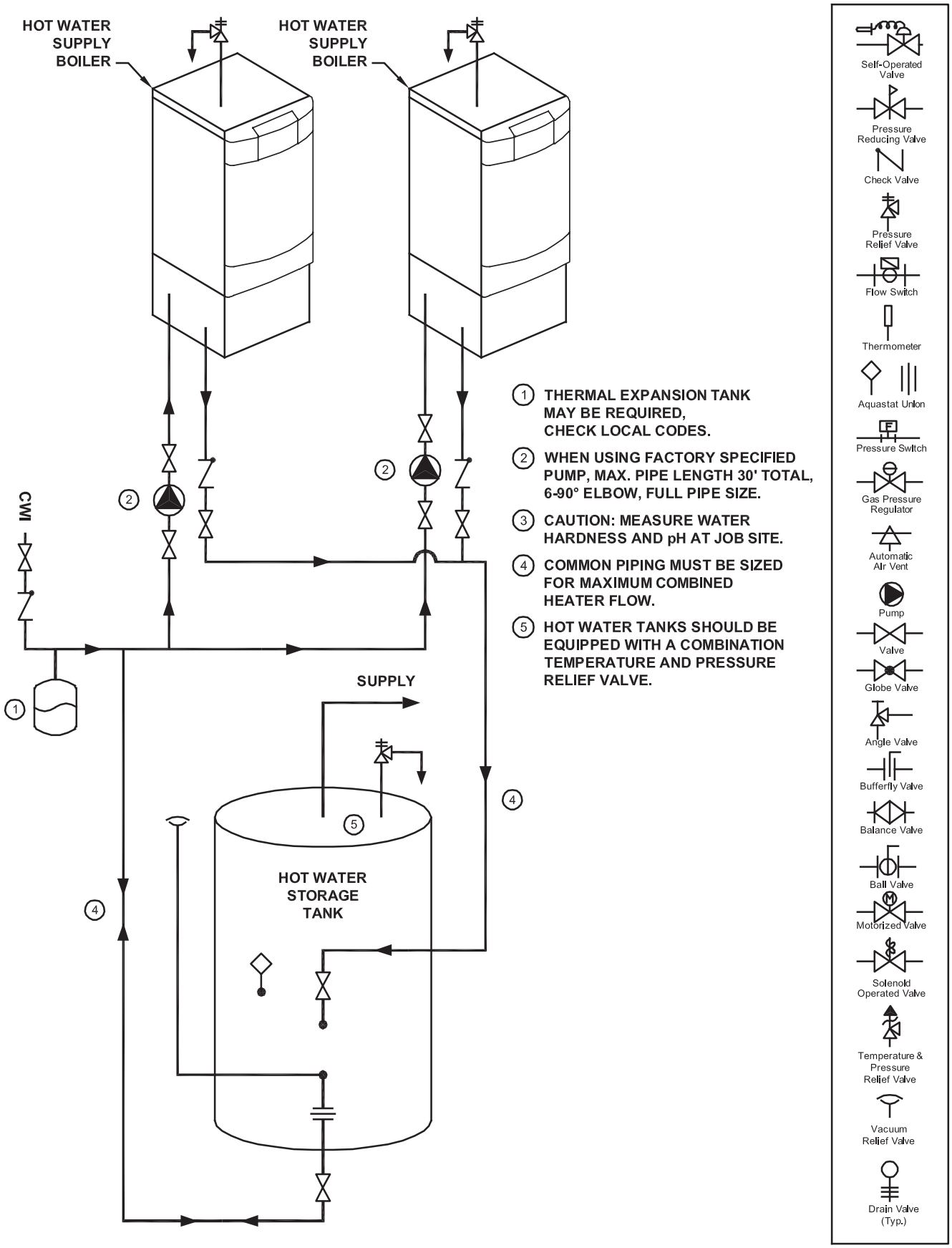


Figure 4.5: Piping – Two Boilers with a Single Storage Tank

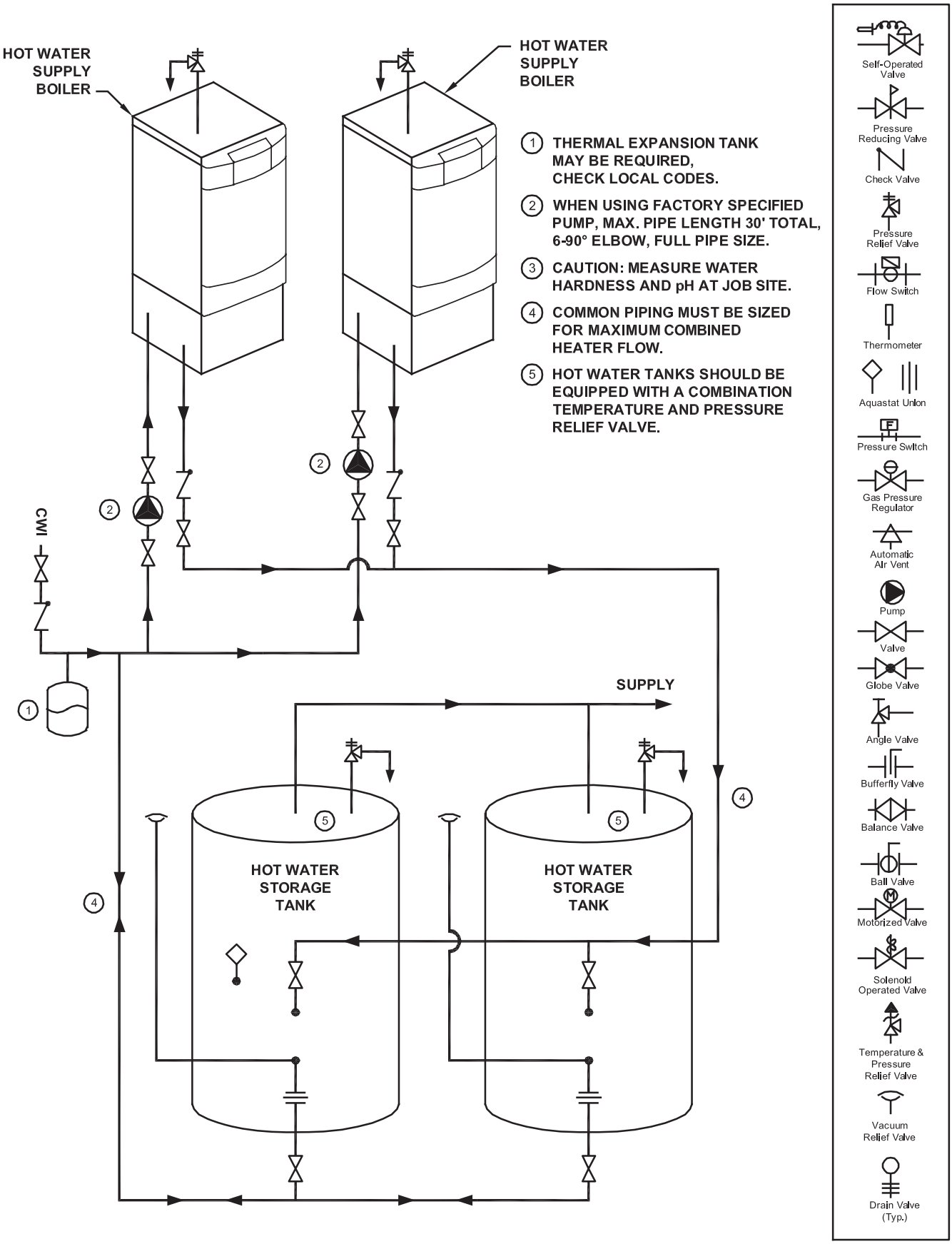


Figure 4.6: Piping – Two Boilers with Multiple Storage Tanks

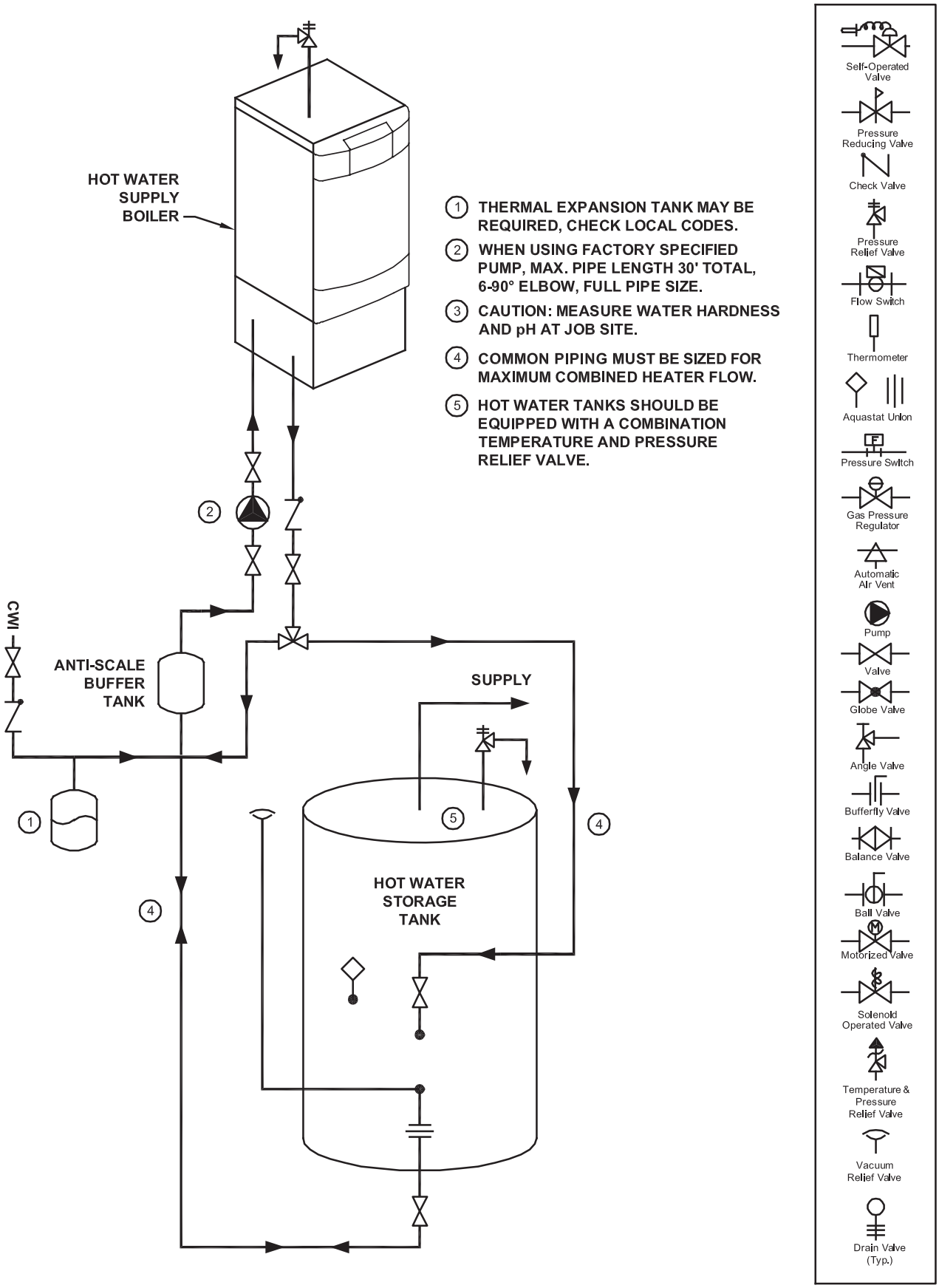


Figure 4.7: Alternate Piping – Patented Anti-Scale Piping

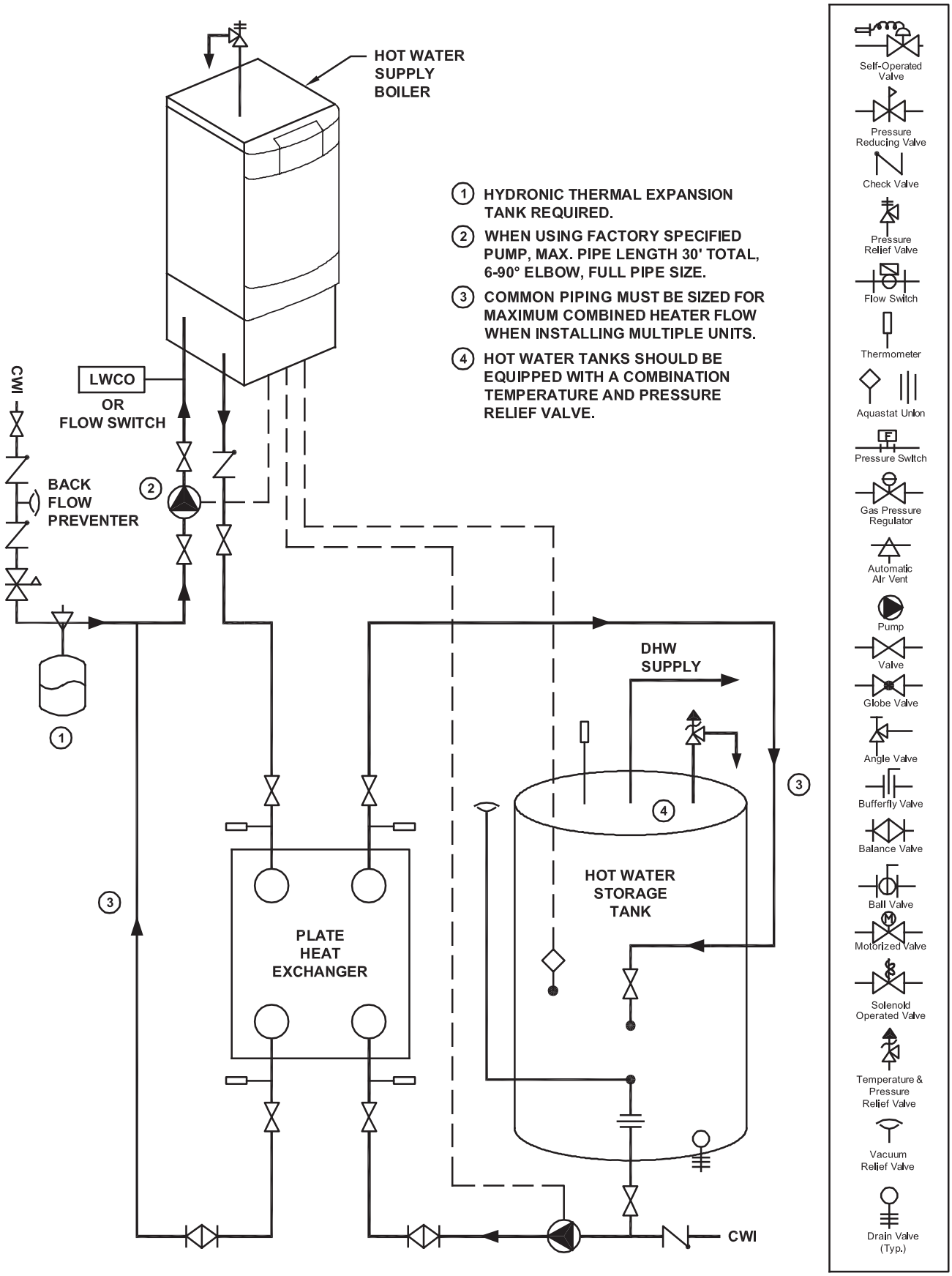


Figure 4.8: Piping –

5. FUEL PIPING

A. GENERAL

1. All fuel piping to the Infinite Energy boiler is to be in accordance with local codes. In the absence of local regulations refer to the *National Fuel Gas Code, ANSI Z223.1/NFPA 54*.

2. Size and install fuel piping to provide a supply of gas sufficient to meet the maximum demand of all appliances supplied by the piping.

B. FUEL LINE SIZING

1. The required flow rate of gas fuel to the boiler can be determined by the following.

$$\text{Input Rate } \left(\text{ft}^3/\text{hr}\right) = \frac{\text{Boiler Input Rate } \left(\text{Btu}/\text{hr}\right)}{\text{Gas Heating Value } \left(\text{Btu}/\text{ft}^3\right)}$$

   The gas heating value can be supplied by the gas supplier.

2. As an alternative, use Table 5.1 to determine the required gas flow rate which uses typical heating values for natural gas and liquefied petroleum (LP) gas.

3. Table 5.2 shows the maximum flow capacity of several pipe sizes based on 0.3" of pressure drop.
   a. The values shown are based on a gas specific gravity of 0.60 (Typical for natural gas).
   b. Multiply the capacities listed by the correction factors listed for gas with a specific gravity other than 0.60 to obtain the corrected capacity.

4. Size and install the fuel gas supply piping for no more than 0.5 inches of water pressure drop between the gas regulator and the boiler.

C. GAS SUPPLY PIPING - INSTALLATION

1. Do not install any piping directly in front of the boiler or along either side. Always provide access to the front cover and side panel openings.

2. Install a sediment trap as shown in Figure 5.1. Be sure to allow clearance from the floor or other horizontal surface for removal of the pipe cap.

⚠ WARNING

Use a pipe joint sealing compound that is resistant to liquefied petroleum gas. A non-resistant compound may lose sealing ability in the presence of this gas, resulting in a gas leak. Gas leaks may potentially cause an explosion or fire.

3. Install a ground joint union between the sediment trap and the boiler to allow service to the appliance.

4. Install a service valve as shown in Figure 5.1 to allow the gas supply to be interrupted for service.

5. Maintain a minimum distance of 10 feet (3048 mm) between the gas pressure regulator and the boiler.

Table 5.1: Required Fuel Input

Infinite Energy Model	Required Input Rate*	
	Natural Gas ft³/hr (m³/hr)	LP Gas ft³/hr (m³/hr)
IEW-199	199 (5.9)	84 (2.4)
IEW-399	399 (11.3)	166 (4.7)

* Natural gas input rates are based on 1,000 Btu/ft³, LP input rates are based on 2,500 Btu/ft³.

Table 5.2: Pipe Capacity:

Maximum Capacity of pipe in cubic feet per hour (cubic meters per hour) with a pressure drop of 0.3" of water (75 Pa).

Pipe Length ft (m)	1/2" NPT Pipe	3/4" NPT Pipe	1" NPT Pipe	1-1/4" NPT Pipe	1-1/2" NPT Pipe
10 (3.0)	132 (3.7)	278 (7.9)	520 (14.7)	1,050 (29.7)	1,600 (45.3)
20 (6.1)	92 (2.6)	190 (5.4)	350 (9.9)	730 (20.7)	1,100 (31.1)
30 (9.1)	73 (2.1)	152 (4.3)	285 (8.1)	590 (16.7)	890 (25.2)
40 (12.2)	63 (1.8)	130 (3.7)	245 (6.9)	500 (14.2)	760 (21.5)
50 (15.2)	56 (1.6)	115 (3.3)	215 (6.1)	440 (12.5)	670 (19.0)
60 (18.3)	50 (1.4)	105 (3.0)	195 (5.5)	400 (11.3)	610 (17.3)
70 (21.3)	46 (1.3)	96 (2.7)	180 (5.1)	370 (10.5)	560 (15.9)
80 (24.4)	43 (1.2)	90 (2.5)	170 (4.8)	350 (9.9)	530 (15.0)
90 (27.4)	40 (1.1)	84 (2.4)	160 (4.5)	320 (9.1)	490 (13.9)
100 (30.5)	38 (1.1)	79 (2.2)	150 (4.2)	305 (8.6)	460 (13.0)

The values are based on a specific gravity of 0.60 (typical for natural gas). See Table 4.3 for capacity correction factors for gases with other specific gravities.

Specific Gravity	0.50	0.55	0.60	0.65	0.70	0.75
Correction Factor	1.10	1.04	1.00	0.96	0.93	0.90
Specific Gravity	0.80	0.85	0.90	1.00	1.10	1.20
Correction Factor	0.87	0.84	0.82	0.78	0.74	0.71
Specific Gravity	1.30	1.40	1.50	1.60	1.70	1.80
Correction Factor	0.68	0.66	0.63	0.61	0.59	0.58

6. Check all gas piping for leaks prior to placing the boiler in operation. Use an approved gas detector, non-corrosive leak detection fluid, or other leak detection method. If leaks are found, turn off gas flow and repair as necessary.

⚠ WARNING

When checking for leaks, do not use matches, candles, open flames or other methods that provide an ignition source. This may ignite a gas leak resulting in a fire or explosion.

7. Figure 5.1 shows the gas shutoff valve for the Infinite Energy boiler. This valve is to be used in addition to the gas service valve shown upstream of the sediment trap.

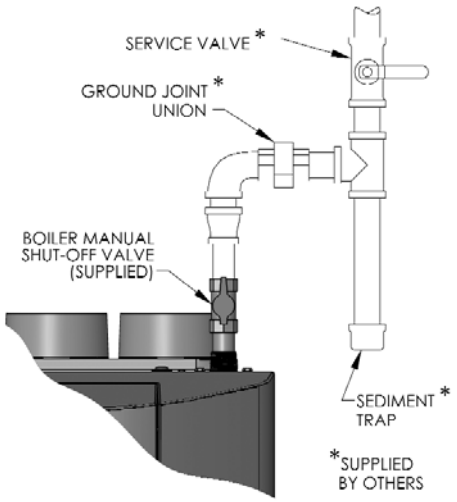


Figure 5.1: Gas Supply Pipe and Shut-off

D. GAS SUPPLY PIPING - OPERATION

1. The gas line must be properly purged of air to allow the boiler to operate properly. Failure to do so may result in burner ignition problems.

2. Table 5.3 shows the maximum and minimum fuel gas supply pressure to the boiler.
   a. Gas pressure below 3.5 inches of water may result in burner ignition problems.
   b. Gas pressure above 13.5 inches of water may result in damage to the automatic gas valve.

⚠ CAUTION

Do not subject the gas valve to more that 1/2 psi (13.5" W.C.) of pressure. Doing so may damage the gas valve.

Table 5.3: Maximum and Minimum Fuel Pressure

Fuel Type	Pressure Inches W.C. (Pa)	
	Minimum	Maximum
Natural Gas	3.5	13.5
LP Gas	3.5	13.5

3. To check the gas supply pressure to on the gas valve:
   a. Turn off the power at the service switch.
   b. Close the gas shutoff valve.
   c. Using a flat screwdriver, turn the screw inside the inlet tap fitting (see Figure 5.2) one turn counter clockwise.
   d. Attach the tube from the manometer to the pressure tap fitting.
   e. Open the gas valve and start the boiler.
   f. Read and record the gas pressure while the boiler is firing.
   g. Turn off the boiler and close the gas shutoff valve.
   h. Remove the manometer tube from the pressure tap fitting.
   i. Turn the internal screw clockwise to close the valve.
   j. Turn on the gas shutoff valve and boiler service switch.
   k. Fire the boiler and check for fuel gas odor around the gas valve. If an odor is evident check to make sure that the pressure tap fitting is closed.

4. All gas piping must be leak tested prior to placing the boiler in operation.
   a. If the leak test pressure requirement is higher than 13.5 inches of water column, the boiler must be isolated from the gas supply piping system.
   b. If the gas valve is exposed to pressure exceeding 13.5 inches of water column, the gas valve must be replaced.

5. Install the boiler such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during operation and service (pump replacement, condensate collector and neutralizer cleanout, control replacement etc.)

E. MAIN GAS VALVE - OPERATION

1. Figure 5.2 is an illustration of the gas valve/venturi assembly for the Infinite Energy boiler.
   a. Adjustments should not be made to the gas valve without instrumentation to measure carbon dioxide (CO_2) and carbon monoxide (CO) emissions in the vent pipe.
   b. Turning the throttle screw clockwise will decrease the gas flow (decreasing CO_2) and turning it counterclockwise will increase the gas flow rate (increasing CO_2). Markings adjacent to the throttle screw show + and – indicating this operation.
   c. The recommended CO_2 settings are given in Table 5.4. In no case should the boiler be allowed to operate with CO emissions above 150 ppm.

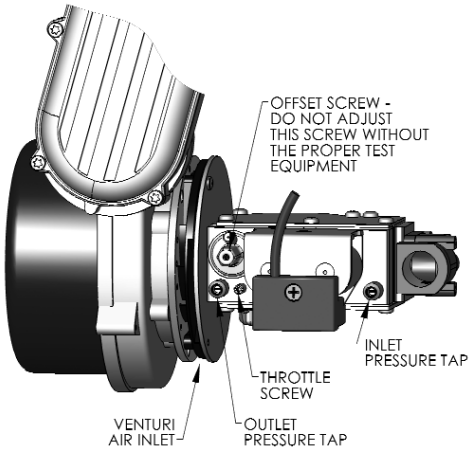


Figure 5.2: Gas Valve/Venturi

Table 5.4: Recommended CO_2 Settings

Gas Type	Firing Rate	Vent CO_2	Vent CO
Natural	Low	8-1/2% to 9-1/2%	< 50 ppm
	High	8-1/2% to 9-1/2%	< 100 ppm
LP	Low	9-1/2% to 10-1/2%	< 50 ppm
	High	9-1/2% to 10-1/2%	< 100 ppm

2. Refer to Section 3, Venting and Air Intake for information on obtaining vent samples from this boiler.

6. CONDENSATE DRAIN PIPING

A. GENERAL

1. The disposal of all condensate into public sewage systems is to be in accordance with local codes and regulations. In the absence of such codes, follow these instructions.

2. Proper piping and removal of condensation from combustion is critical to the operation of a condensing appliance. Follow these instructions carefully to assure that your Infinite Energy boiler operates correctly.

3. Depending on several factors, the condensate from gas fired condensing appliances may have a pH value as low as 2.5 (similar to cola soft drinks). Some local codes require the use of neutralization equipment to treat acidic condensate.

B. CONDENSATE SYSTEM

The Infinite Energy condensate system is designed to prevent condensate from backing up into the heat exchanger, trap the condensate to prevent combustion gases from escaping and neutralize acidic condensate. Refer to Figure 6.1 for an illustration of the system components.

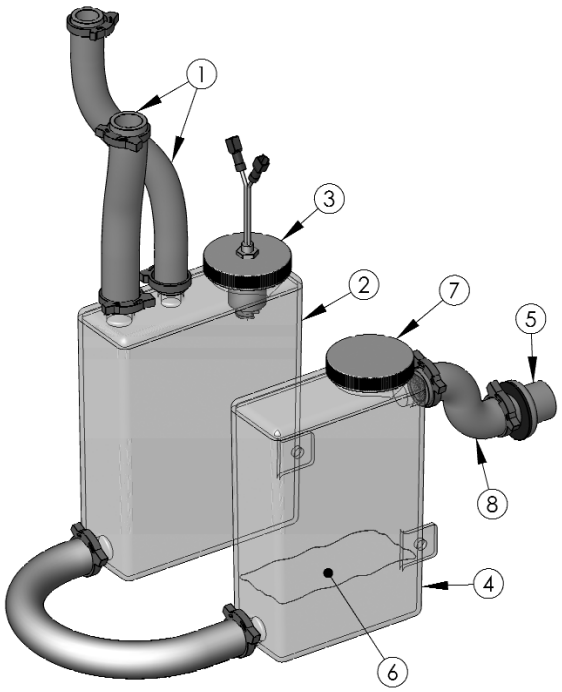


Figure 6.1: Condensate Trap System

1. *Condensate Drain Hoses*: The IEW-199 and IEW-399 boilers have two drain hoses attached to the heat exchanger. The first hose drains condensate from the combustion chamber of the boiler. The second hose drains condensate from the vent system. This prevents dirt and debris from the venting system from entering the heat exchanger and fouling the heating surface.

   IEW-199 and IEW-399 boilers have only one drain attached directly to the combustion chamber. To prevent debris from entering the heat exchanger, a separate drain can be added to the vent system as shown in Figure 6.2. However, be sure to adequately trap any vent system drains.

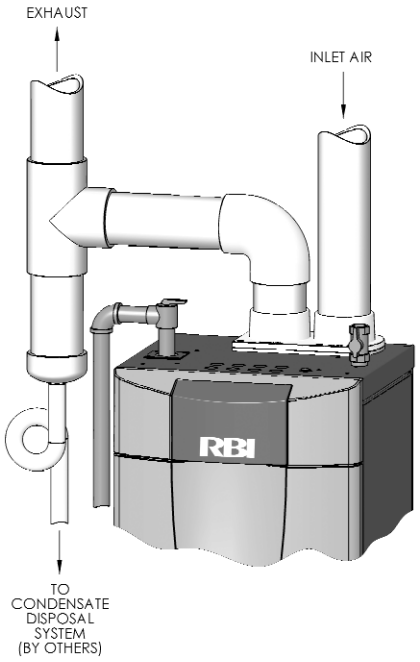


Figure 6.2: Separate Vent Condensate Drain Installation

2. *Condensate Collector Container*: The condensate collector container is a transparent container in the base of the boiler near the back. This container collects the condensate and acts as a part of a trap to prevent combustion gases from escaping. The container is fitted with a level switch that will prevent the boiler from operating if the condensate line is clogged.

3. *Condensate Float Switch*: This switch will prevent the boiler from operating if the condensate outlet is clogged before the level of condensate reaches the heat exchanger.

4. *Condensate Neutralizer Container*: The condensate neutralizer container is an additional transparent container near the front of the boiler. Fill this container with the condensate neutralizer provided. The neutralizer will be consumed during normal operation and should be checked occasionally to determine if additional neutralizer is necessary. Neutralizer is available in 1 lb bags (#3354159) from your RBI Distributor.

5. *Bulkhead fitting*: The bulkhead fitting allows the condensate tubing to pass through the jacket without providing a path for leakage from the jacket. A PVC TEE is to be attached to the outlet of this fitting to prevent siphoning of the trap.

6. *Neutralizer*: Condensate neutralizer is provided in a package with the boiler to fill the condensate neutralizer container (Item 4).

7. *Neutralizer Cap*: This cap provides access for adding and inspecting the condensate neutralizer.

8. *Condensate Drain Tube*: This pre-formed tube connects the condensate system to the bulkhead fitting for attachment to an external drain.

C. CONDENSATE DRAIN PIPE MATERIAL

The condensate drain is to be piped using PVC, polypropylene, or other material resistant to acidic condensate. Do not use steel, brass or galvanized pipe for this purpose. The acidic condensate will attack most metals and corrode.

D. CONDENSATE DRAIN PIPE SIZING

The bulkhead fitting for condensate connection is for 3/4" schedule 40 PVC Pipe. Be sure to use 3/4" or larger tubing from the boiler to the drain.

E. CONDENSATE DRAIN PIPE INSTALLATION

1. Connect a 3/4" schedule 40 PVC Tee to the outlet of the bulkhead fitting as shown in Figure 6.3. Pipe from the bottom of the tee to a suitable drain.

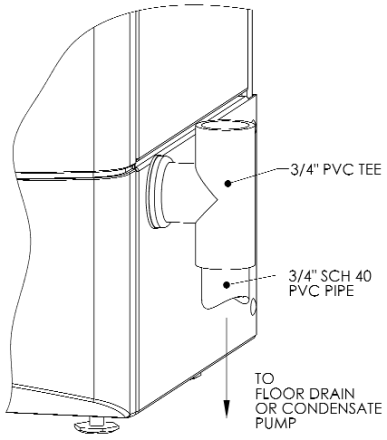


Figure 6.3: Condensate Drain Piping

2. Be sure that the piping slopes away from the boiler with a pitch of 1/4" per foot of pipe.

3. If the boiler condensate drain is above the level of a gravity drain, a condensate pump should be used. Table 6.1 lists several available brands. Contact your RBI Distributor for availability.

Table 6.1: Recommended Condensate Pumps

Brand Name	Model Number
Little Giant	VCMA-15UL
Beckett	CB151LSUL
Hartell	KT-15-1UL

7. ELECTRICAL CONNECTIONS

A. GENERAL

This appliance is to be wired in accordance with local codes and regulations as defined by the Authority having jurisdiction. In the absence of such local codes, the Infinite Energy boiler is to be wired in accordance with the latest edition of the *National Electrical Code, ANSI/NFPA 70*.

B. CUSTOMER CONNECTIONS

1. Electrical knockouts are provided on the top panel of the boiler to connect supply wiring, pump wiring and wiring to various instruments.

2. Electrical terminals are located behind the User Interface and can be accessed by loosening the two nuts shown in Figure 7.1.

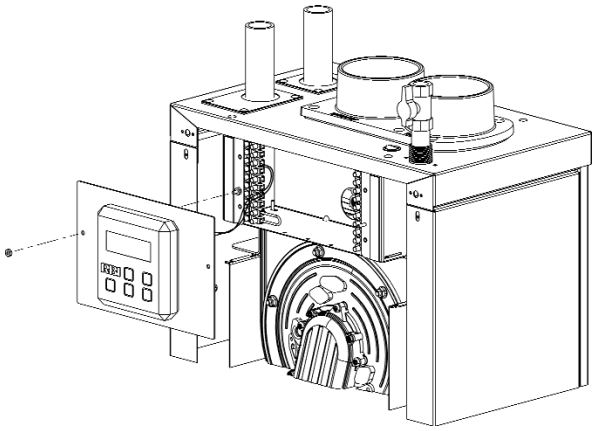


Figure 7.1: Electrical Terminal Access

   a. Remove one of the nuts and leave the other fully loosened in order to leave the display interface panel connected to the appliance.
   b. The terminals can be removed by gently pulling them away from their wired blocks. This allows the installer to easily attach wires to the connector before plugging it into the block.

3. Figure 7.2 shows customer connections for the IEW-199 and IEW-399 boilers.
   a. Terminals 1-10 on the left side are for low voltage customer connections to the DHW sensor or thermostat contacts, system sensors and low water cutoff contacts. The DHW sensor (3354157) is included and the system sensor (3354156) is optional. The low water cutoff, if used, is to be supplied by others.
   b. Terminals 11 & 12 on the left side are for connecting multiple boilers together using a cascade link which is described in Section 8.
   c. Terminals 13 & 14 on the left side are dry contacts that will close when there is a DHW call for heat.
   d. Terminals 15 & 16 are not yet active.
   e. Terminals 17 through 26 on the right side are for line voltage customer connections to a 3-way valve and DHW pumps; voltage supply, and low water cutoff (LWCO) power output.
   f. Terminals 27 through 30 are a ground bus for any line voltage ground connections.
   g. Terminals 31 & 32 are not yet active.

⚠ CAUTION

The maximum combined pump/3-way valve load is 3 amps. If the load on terminals 17 & 18 plus the load on terminals 21 & 22 is greater than 3 amps, install isolation relays.

4. Note that the service switch does not disconnect power to the convenience outlet.

C. INTERNAL WIRING

Figure 7.3 shows the complete boiler wiring schematic for Infinite Energy boilers. The following is a list of internal wiring components.

1. *User Interface*: The user interface is attached to the front of the electrical junction box and is accessible by removing the tinted lens on the front of the boiler. This interface allows users and installers to communicate with the control.

2. *Supply Sensor/Limit Switch*: This component, located on the left header is a thermistor that provides temperature information to the control. Also incorporated into this component is a high temperature limit switch that will prevent the boiler from operating if the supply water temperature is above 195°F (91°C). Be sure to use only a Infinite Energy supply thermister for this boiler.

3. *Return Sensor*: This thermistor is also located on the left header toward the rear of the boiler. It provides return temperature information to the control. Be sure to use only a Infinite Energy return thermistor for this boiler.

4. *Flue Sensor*: This thermistor provides flue temperature information to the control. It is located in the vent connection inside the appliance jacket.

5. *Condensate Drain Float Switch*: This switch is mounted in the condensate collector below the heat exchanger in the rear of the cabinet.

6. *Service Switch*: The service switch interrupts the power to the Infinite Energy boiler to allow service to be performed.

⚠ NOTICE

The service switch does not disconnect power from the convenience outlet.

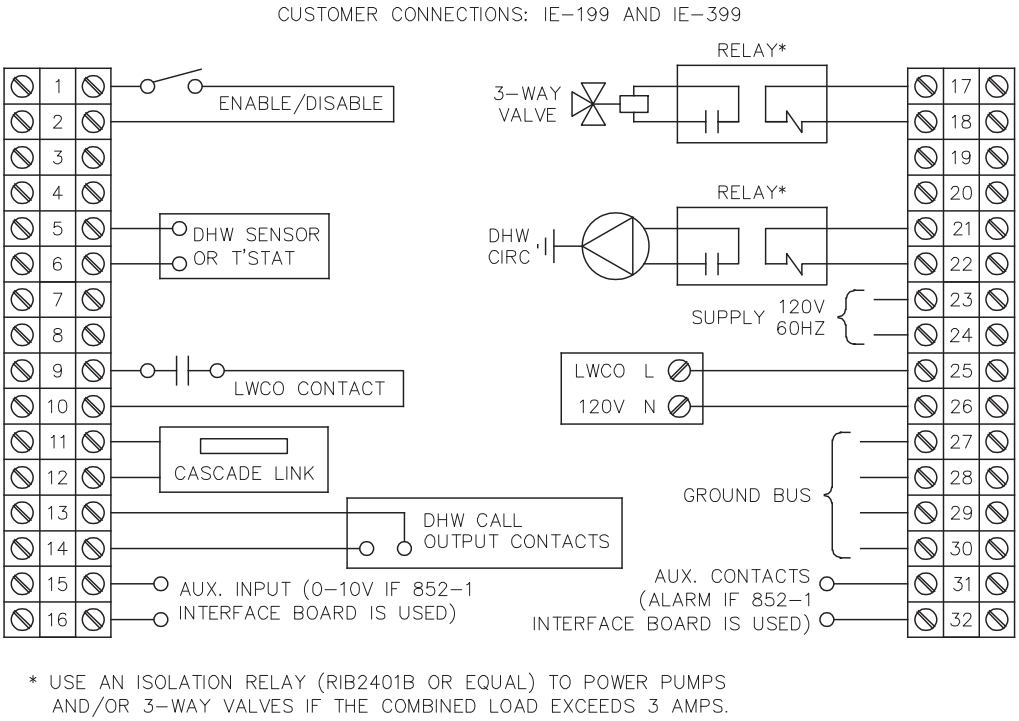


Figure 7.2: Customer Connections

7. *Convenience Outlet*: The convenience outlet is provided for a condensate pump during operation. It is not switched with the service switch to allow its use during maintenance.

8. *Flame Sensor*: The flame sensor uses the principal of flame rectification to sense the burner flame. This is located on the right side of the heat exchanger front plate. After ignition, the control also senses flame through the ignition electrode.

9. *Gas Valve*: The gas valve is connected through a special cord and connector. The connector is attached to the valve with a screw.

10. *Ignition Electrode*: This electrode is located on the left side of the heat exchanger front plate. A 10,000 volt charge is initiated by the control to provide a spark for lighting the burner. After the burner lights, and no spark is present, the control uses this electrode as a second source of flame detection.

11. *Combustion Air Fan*: The combustion air fan has two connections. There is a 120 volt power connection (3-wire) and a low voltage control connection (4-wire).

12. *Relay*: A relay is provided to close contacts at terminals 13 & 14 when a call for DHW is present.

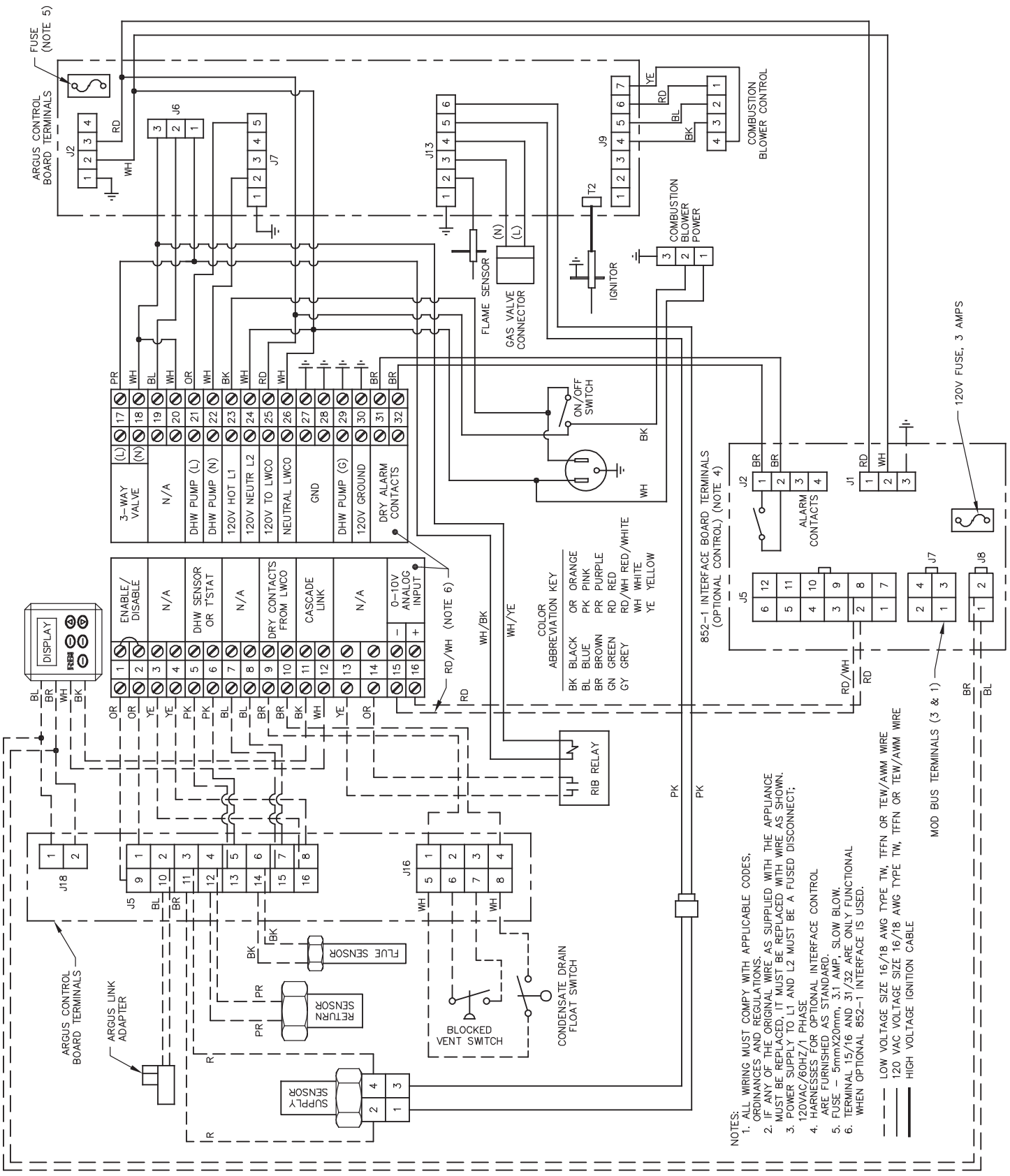


Figure 7.3: Internal Wiring Schematic for IEW-199 & IEW-399 boilers.

8. BOILER CONTROL: INTERNAL WIRING & OPERATION

A. CONTROL OVERVIEW

The Infinite Energy boiler control is one of the primary safety devices for the boiler. It controls the ignition sequence, temperature limits, pumps and gas flow to the boiler. It also provides many unique features.

The control provides 3 domestic hot water modes and can be adapted to several different piping schemes.

To provide maximum flexibility, several special features are also included

Table 8.1: Domestic Hot Water (DHW) Modes

DHW Mode	Display Text	Brief Description	Detail Section	Page
1	DHW Tank with Sensor	The domestic hot water tank is equipped with a temperature sensor. The Infinite Energy control modulates the boiler firing rate based on supply water and tank temperatures.	8.C.1	33
2	DHW Tank with Thermostat	The domestic hot water tank is equipped with a thermostat. The Infinite Energy control responds to a demand from the thermostat and modulates the boiler firing rate targeting the boiler supply setpoint.	8.C.1	33
3	External DHW Setpoint Control	An external 0-10 VDC analog input (ie. from a Building Management System) is supplied to adjust the domestic hot water tank setpoint temperature. (Additional hardware is required.)	8.C.1	33

Table 8.2: Control Features

Feature	Brief Description	Detail Section	Page
DHW Tank Warm Hold	Prevents boiler from ramping up to high power if the DHW demand is only to keep the tank warm. This feature is only available if the tank sensor is used.	8.C.6	34
System Test	The control will allow the installer to operate the boiler at low power, high power and ignition input for setup and troubleshooting purposes.	8.E	34
Flow Switch Capability	The “Add’l Safety Functions” feature allows the installer to choose between a low water cutoff and a flow switch for water level safety shutdown.	8.C.7	34
Restore System Defaults	This feature allows the installer or service person to restore all of the factory parameters to the factory defaults if desired. The site settings can also be stored and reset.	—	—
Service Notification	If enabled, the Infinite Energy control will display a service notification after an installer defined number of hours or cycles. It can also display a notification based on a date of the installers choosing.	8.F	34
Fault History	The Infinite Energy control allows service personnel to access the last 15 Blocking Errors and the last 15 Lockout Errors in addition to records of the interval between Errors.	8.H	35
Vent Temperature Safety Limit	Reduces the firing rate if the vent temperature approaches the maximum limit of the vent material. If the vent temperature continues to climb, the Infinite Energy control will shut down the boiler.	8.4	33
Adjustable Blower Postpurge	This feature allows the installer to increase the blower postpurge to counteract the effects of high winds or unusual wind currents.	—	—
Flame Signal Log	This troubleshooting tool captures the flame signal at four increments during the two second flame proving period. This can help the installer or service person to quickly diagnose problems with flame rectification.	—	—
Freeze Protection	Activates pumps if temperatures fall below the specified value. If the temperatures continue to fall, the boiler is activated at a minimum firing rate.	—	—

B. IGNITION SEQUENCE

Figure 8.1 shows the ignition sequence for the Infinite Energy boiler control. Table 8.3 describes each step in the sequence in detail. The boiler control provides dual sensing of the flame to maximize the reliability. The control senses the burner flame with both the flame sensor and the ignition electrode.

Igntion Cycle

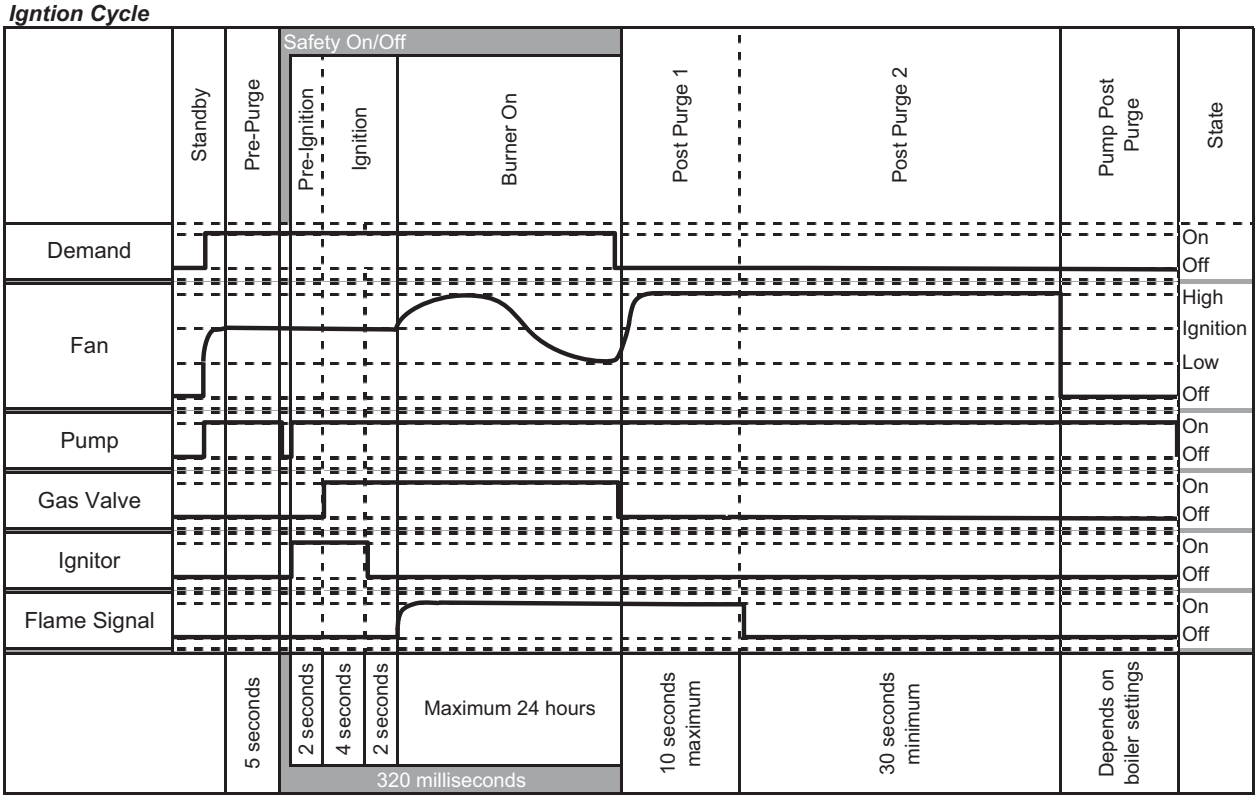


Figure 8.1: Ignition Cycle – Graphical Representation

Table 8.3: Ignition Sequence

Period	Demand Status	User Interface Display
Standby	No demand is present.	16:36 STANDBY 160 °F
	If the power is on to the Infinte Energy boiler and there is no heat demand, the user interface will display "Standby" and show the boiler supply temperature in the lower right corner. The time, in 24 hour format, is shown in the upper right. When a heat demand (either CH or DHW) is present, the boiler begins the ignition cycle.	
Pre Purge	A DWH demand must be present to initiate ignition. Once initiated the boiler will light.	16:36 DOMESTIC HOT WATER Trial For Ignition
	When a demand is present, the control starts the combustion air fan. The fan speed then increases to ignition speed and the user interface displays "DOMESTIC HOT WATER" along with "Trial for ignition." This screen is displayed until the burner is lit and stable or until a fault occurs. Once the ignition sequence begins it will continue through ignition even if the demand has ended.	

Period	Demand Status	User Interface Display
Safety On/Off	A heat demand has no influence in the Safety On/Off period. The Safety On/Off step will continue even if the demand has ended.	16:36 DOMESTIC HOT WATER Trial For Ignition
	This step very quickly opens and closes the gas valve relays and determines if the control is operating correctly.	
Pre-Ignition	A heat demand has no influence in the Pre-Ignition period.	16:36 DOMESTIC HOT WATER Trial For Ignition
	Once the internal check is complete, the control begins a Pre-Ignition sequence. The igniter is energized while the gas valve remains off. If a flame is detected at the end of the pre-ignition period a lockout will occur.	
Ignition	A heat demand has no influence in the Ignition period.	The following displays occur on ignition failure only. 16:36 DOMESTIC HOT WATER Ignition Retry 16:36 NO IGNITION Fan Post Purge
	The igniter remains energized for the first 4 seconds of the Ignition period. For the final 2 seconds of the Ignition period, the igniter is turned off and the control checks for a flame signal through both the ignition electrode and the flame sensor. If no flame signal is present at the end of the Ignition period, the control initiates a post-purge and then begins the ignition cycle again. If there are three consecutive ignition failures, the control will post purge and lockout.	
Burner On	A heat demand must be present for the control to stay in this period.	16:36 DOMESTIC HOT WATER 100%Input 160°F
	Once the flame signal is established, the burner will run until the demand is satisfied, the setpoint is exceeded, or a blocking error occurs. The maximum run period for the burner is 24 hours. If the boiler runs continuously for 24 hours, the control will override the demand and turn off the burner. After this a restart will occur and the burner will continue to run.	
Post Purge 1	After the Post Purge period begins, a heat demand will be ignored until after this period.	The following screen is displayed when the demand has ended. 16:36 DOMESTIC HOT WATER Fan Post Purge
	During post purge 1, the control monitors the flame signal to be sure that the flame has extinguished. If a flame is detected after the maximum 10 second time period, a control lockout will occur.	
Post Purge 2	During this period a heat demand has no effect on operation.	The following screen will be displayed if the supply temperature exceeds the target setpoint. 16:36 SUPPLY AT SETPOINT Fan Post Purge
	During this period, the combustion air fan runs at high speed to purge combustion gases from the heat exchanger. The minimum setting for the fan post purge is 30 seconds. This can be increased to 90 seconds at the installer level of access.	
Pump Purge	No heat demand is present.	16:36 DOMESTIC HOT WATER Circulator On
	The operation of the pumps and the boiler depend on the heat demand status.	

C. BOILER CONTROL

1. **DHW Modes:**
The Infinite Energy control enables the installer to choose from 3 different domestic hot water (DHW) modes. Table 8.1 provides a brief overview of the available modes. The following are detailed explanations of the DHW modes.

Mode 1 – DHW Store with Sensor: In this mode, the control accepts a temperature input from the domestic tank sensor that is included with the boiler. This sensor provides the DHW water temperature value to the control. The control targets the user selected DHW setpoint and modulates the boiler firing rate accordingly.

⚠ WARNING

Be sure to use only the tank sensor provided. Other sensors will not provide accurate tank temperatures and may cause severe personal injury due to scalding.

⚠ DANGER

Water temperatures over 125°F (52°C) can instantly cause severe burns or death from scalding. Children, elderly and disabled individuals are at the highest risk of scalding. See instruction manual for the indirect tank before setting the water heater temperature. Instruct users to feel the water temperature before bathing or showering. Anti-scald valves are recommended.

Mode 2 – DHW Store with Thermostat: In this mode, the control is connected to the DHW tank temperature limit. When the limit closes, the control modulates the boiler firing rate to target a boiler supply setpoint. This setpoint is a user selected value with a factory default of 160°F (71°C). The allowable range for this value is 120°F (49°C) to 195°F (91°C).

⚠ NOTICE

The "Store Warm Hold" function will not be functional if the DHW tank mode is set to 2. This requires a DHW tank sensor.

The control will reduce the boiler firing rate if the vent temperature approaches the vent temperature limit. If the vent temperature continues to rise, the control will shut down the boiler.

Mode 3 – DHW Store with 0-10 VDC Input: In this mode, a 0-10 VDC signal corresponding to the desired setpoint temperature is provided to the 852-1 Interface Board by an external source. The following chart shows the corresponding setpoint for various temperatures.

Input Signal (VDC)	Setpoint (°F)	Input Signal (VDC)	Setpoint (°F)
0	50.0	6	137.0
1	64.5	7	151.5
2	79.0	8	166.0
3	93.5	9	180.5
4	108.0	10	195.0
5	122.5		

This mode is commonly used in conjunction with a Building Management System (BMS) to control the boiler setpoint based on the building hot water requirements.

2. **Max DHW Pump:**
This feature limits the maximum time that the DHW pump runs to allow the supply and return temperatures to equalize after the burner shuts down.

The default time for this option is 15 seconds. It is adjustable from 0 to 255 seconds.

3. **Supply Return TDiff:**
The control runs the DHW pump until the difference between the supply and return temperature are below the TDiff value.

The default value is 4°F (2°C), which means that if the supply is 120°F (49°C) and the return is 116°F (47°C) the pump will stop operating.

4. **Installation Location & Vent Material:**
The Infinite Energy boiler allows the installer to input the installation location and the vent material used. This information is used to determine the suitable vent temperature limit based on National Codes. Table 8.6 shows the vent temperature limit based on the location and vent material.

Table 8.6: Vent Temperature Limits

Vent Limit Temperature		
Vent Material	Location	
	U.S.A.	Canada
PVC	190°F (80°C)	149°F (65°C)
CPVC	230°F (110°C)	190°F (80°C)
PP(s)	230°F (110°C)	230°F (110°C)

5. **Freeze Protection:**
The Infinite Energy boiler control is intended to prevent the central heating system from freezing. The default temperature to activate this function is 50°F (10°C).

If the supply temperature drops to below the freeze protection setpoint, the general pump and/or the CH pump (depending on pump mode) will be activated. If the supply or return temperature drops more than 9°F (5°C) below the setpoint, the control lights the boiler using the ignition sequence described in section 8.B.

The control will operate the burner at minimum power until the both the supply and return boiler temperature are more than 9°F (5°C) above the freeze protection setpoint.

While this function is active the interface panel will display the following:

6. **DHW Warm Hold:**
When using a DHW tank sensor, the Infinite Energy boiler control can detect if the DHW heat demand is only due to standby losses and not due to a hot water draw. If this standby demand is detected, the control holds the burner on at its minimum firing rate (1% on the display) and continues until the setpoint is satisfied. If there is a hot water draw while it is satisfying this demand, the boiler will increase to the input rate required to satisfy the demand.

7. **Additional Safety Functions:**
The boiler control is equipped with terminals for either a low water cutoff or a flow switch.

   Low Water Cutoff: The installer can connect the power supply wires for a probe-type low water cutoff to terminal #19 (Hot) and #20 (Neutral) in the main terminal box. The contacts should be wired to terminals #9 and #10.

   Flow Switch: If a flow switch is used, simply wire the contacts to terminals #9 and #10 in the main terminal box and choose the Flow Switch option on the Installer Menu.

   If this option is chosen, the control first checks to see if the switch is operating correctly (no flow with the pump off). The control then powers the pump and assures that the switch is in the open position.

8. **Blower Post Purge:**
The boiler control is provided with a 30 second combustion chamber post purge as the default setting. In situations where wind conditions interfere with proper purging of the boiler, this value can be increased up to a maximum of 120 seconds. Increasing the post purge may adversely effect the fuel economy of the boiler, so this value should only be changed where it is absolutely necessary.

D. SERVICE NOTIFICATION

The Infinite Energy boiler control allows the installer to enable Service Notification through the installer menu. After enabling this feature, the installer selects the number of hours, the number of cycles, or the date when the "SERVICE" text appears on the display screen. This will prompt the user to call for service on the appliance.

The following chart shows the range and default values for the Service Notification feature.

	Min.	Max.	Default
Notification	On	Off	Off
Hours	0	8,000	4,000
Cycles	0	50,000	10,000

If desired, the installer can set a specific date for the Service Notification.

To access the Notification menu operate the boiler under System Test, enter the installer menu by holding down the "Menu" and "Select" keys simultaneously for 10 seconds. Then press the "▼" key until the "➔" indicates "Service Notif." Press the "Select" key to choose the menu.

The first option is to reset the Notification Timer / Counter. Pressing the "Select" key will reset the timers and counters and "Done" will be shown in place of "Reset" on the lower right of the screen.

Pressing the "▼" key displays the "SERVICE Notification on" screen. The default setting for "Notification on:" is "Off" indicating that no notification will occur. The installer can choose from the number of hours (HRS), the number of cycles (CYCLES) or the Date at which the "SERVICE" indication will appear on the display screen.

The menus that follow allow the installer to choose the actual values for the Service Notification.

E: SYSTEM TEST

The System Test feature allows the installer or service person to make the control operate at Low Power, Ignition Power, or Maximum Power. This is a setup and troubleshooting tool that allows the installer or service person to obtain combustion readings or observe operation.

In DHW Mode 1 and Mode 3, the tank temperature must be lower than the setpoint to allow the System Test mode to operate. If the tank temperature exceeds the setpoint, the boiler will stop.

In DHW Mode 2, the tank thermostat must be calling for heat in order for System Test to operate.

To operate the boiler under System Test, enter the installer menu by holding down the "Menu" and "Select" keys simultaneously for 10 seconds. Then press the "▼" key until the "➔" indicates System Test. Press the "Select" key to choose the menu. The default setting for System Test is "Off". Choose the desired setting and press "Select" again to initiate the test.

Once the System Test is initiated, the service person may exit the menu screen by pressing the "Menu" key until the status screen is displayed. "System Test" will be displayed at the top of the display screen until the operator exits the system test mode.

⚠ NOTICE

Be sure to set the System Test parameter back to "Off" before leaving the installation. Otherwise, problems with cycling or insufficient heat may occur.

F. STATUS & FAULT HISTORY

1. **General:**
The Infinite Energy boiler control allows the installer to view the status of several key parameters. In addition, it provides details in English about the last 15 Blocking Errors and the last 15 Lockout Faults.

   The Status and Fault History can be viewed from the Installer Menu. The Installer Menu Structure is shown in Appendix C of this manual.

   This menu can be accessed by pressing and holding the "Menu" and "Select" keys simultaneously for 10 seconds. The "➔" indicator will be indicating "Status". Press the "Select" Key to access this feature.

2. **Status:**
Current Supply Setpoint: The first screen indicates the current supply setpoint. In CH Mode 0, 3, and 6 this will be the setpoint selected from the User Menu. If the boiler is operating an outdoor reset mode (CH Mode 1 or 2) this value will be the target setpoint temperature calculated based on the outdoor temperature. In CH Mode 4, this value will correspond to the 0-10 V signal input.

   Fan Speeds: By pressing the "▼" key the operator can view the current fan speed and the low power fan speed. The current fan speed will be directly comparable to the current input rate. The low power fan speed is a factory preset software parameter that indicates the minimum input to the boiler.

   Pressing the "▼" key again displays the ignition and high power fan speed. Both of these are factory preset software parameters that cannot be changed by the installer. The ignition speed is the speed at which the blower runs during the ignition period. The high power fan speed corresponds to the maximum input to the boiler.

   Flame Signal/Failures: Pressing the "▼" key again will display the Flame Signal/Failures Screen. The flame signal is an indication of combustion stability of the burner. If this value is below 1.7 μA (microampere) the control will close the gas valve and the burner will recycle through the ignition cycle. The flame signal should be above 5.0 μA in normal operation.

   If the control loses its flame signal 3 times during one call for heat, it will lock out the control indicating, "Flame Failure". The number of flame failures in the history of the control is displayed below the flame signal on the menu screen.

   The control uses dual flame sensing to minimize nuisance lockouts. See Section 10, Troubleshooting, to address flame failure issues.

   Ignition Attempts: Once again, press the "▼" key to advance to the Ignition attempts status screen. This screen displays the number of successful and failed ignition attempts that have been made by the control. If excessive ignition attempts are shown on this screen, reference Section 10, Troubleshooting.

   Boiler Run Time: Pressing the "▼" key again advances the menu to show Boiler Run Time. This indicates the number of hours that the boiler has operated under CH or DHW demand. The values are rounded to the nearest hour.

3. **Fault History:**
The following sections provide instructions on how to access the fault history that is stored on the control. The control stores the last 15 blocking errors and the last 15 lockout errors and allows the installer or service person to review the fault history of the control.

   Section 10, Troubleshooting, provides detailed descriptions and troubleshooting approaches to the errors reported by the control.

   Last Block: By continuing to press the "▼" key, the status menu displays the following screen. The last block indicates the last blocking error (error that does not cause a lockout). The first number indicates the time interval in minutes since the previous error. The #EXX represents the Error Code which can be referenced in Section 10, Troubleshooting. The last two lines provide an English description of the error.

   Last Lock: The next screen accessed by pressing the "▼" key provides information about the last lockout error. Again the first number represents the interval since the last lockout error. #AXX represents the Fault Code which can be referenced in Section 10, Troubleshooting. Again the last two lines provide an English description of the fault.

G. SENSOR RESISTANCE

See Figure 8.7 for typical resistance of the boiler sensors.

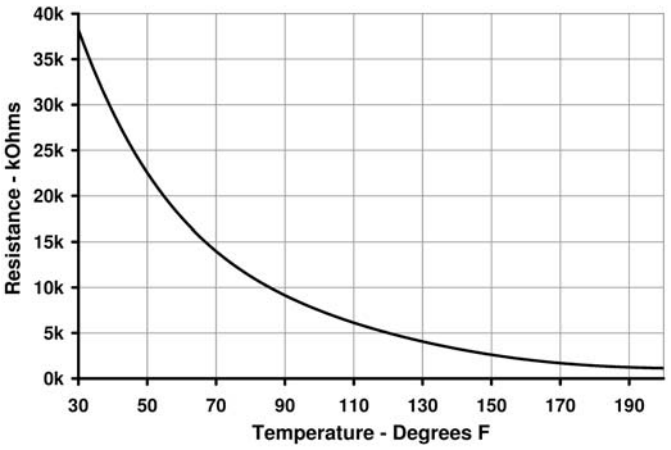


Figure 8.7: Sensor Resistance

H. MULTIPLE BOILERS

1. Infinite Energy boiler controls can operate together to control up to 16 boilers for one Domestic hot water demand (single or multiple tanks). Only one DHW Tank Sensor is required to provide this operation.

2. **Overview:**
   a. Master Boiler: In a multiple boiler system, a boiler designated as the "Master" boiler controls the function of the boiler system.
      - The domestic water sensor is attached to the master boiler to monitor the DHW system temperature.
      - The master boiler determines which boiler operates first and when to bring on additional boilers.
      - The master boiler determines the input rate at which to operate individual boilers.
      - Shuts down all boilers in the system if the LWCO contacts are opened.

   b. Dependent Boilers: The "Dependent" boilers operate at the input rate and/or temperature that the master boiler specifies.
      - Dependent boilers maintain all of their own safety parameters such as high temperature limiting, vent temperature limiting and freeze protection.
      - Dependent boilers control their own general circulator that is energized whenever there is a heat call from the master boiler.
      - Dependent boilers will shut down if its LWCO contacts are opened.

3. **System Piping & Wiring:**
   Figures 4.5 and 4.6 show multiple DHW Supply Boilers which operate with single or multiple tanks.
   - Each circulator is wired to the "General" pump terminals in the boiler which it serves.
   - The "Master" boiler is connected to either a tank temperature sensor or to the tank thermostat.

4. **Setting up Multiple Boiler Operation:**
   a. Setting the Boiler Address:
      - Press the "Menu" and "Select" keys simultaneously for 5 seconds to enter the Installer Menu.
      - Use the "▼" key to scroll down to "Cascade Settings" on the menu.
      - Pressing "Select" will cause the Boiler Address value to blink. Use the "▼" and "▲" keys to change the value.
      - The master boiler is to be designated as Boiler Address: 1.
      - All dependent boilers must have sequential boiler address settings as shown on the following table.

Table 8.7: Cascade Addresses and Sensor Functions

Boiler Operation	Cascade Address	System Sensor	Outdoor Sensor	DHW Sensor
Stand-alone Boiler	0	Not Active	Active	Active
Boiler #1 Master	1	Active	Active	Active
Boiler #2 Dependent	2	Not Active	Not Active	Not Active
Boiler #3 Dependent	3	Not Active	Not Active	Not Active
↓	↓	↓	↓	↓
Boiler #16 Dependent	16	Not Active	Not Active	Not Active

   - Once a boiler is designated as a dependent boiler, the display will show the individual boiler supply temperature and its status.
   - The master boiler will display the DHW tank temperature and the overall status of the cascade system.
   - By pressing the "▲" and "▼" keys the operator can view the supply temperature and status of the master boiler itself.

   b. Connecting the Cascade Links:
      - Remove the User Interface Display from the Master boiler only.
      - Slide the master switch lever toward the center of the printed circuit board. The Master Switch Lever is not marked with "ON" or "OFF" but the switch is in the "ON" position when it is moved to the left as viewed from the back of the display. The position is shown in Figure 8.8.

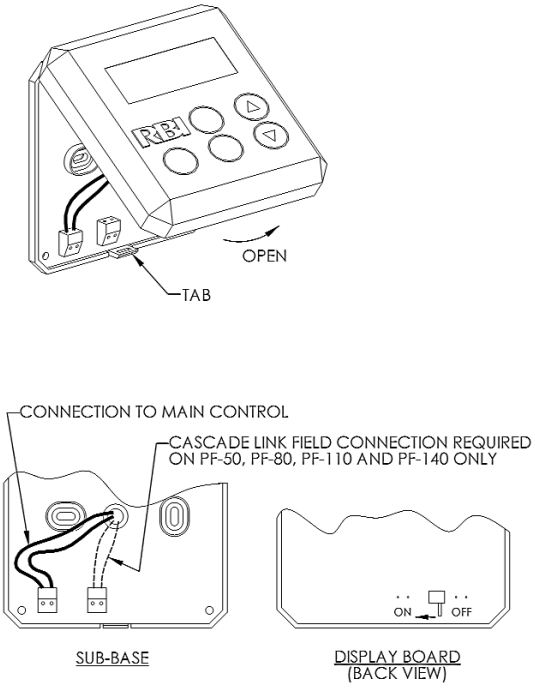


Figure 8.8

- Re-attach the User Interface Display.
- Connect wires from terminals #11 &#12 between all boilers in the cascade system. See Figure 8.9.

2. **Cascade Operation:**
   a. When a call for Domestic Hot Water (DHW) is present, the master boiler chooses which boiler will lead based on the Cascade Rotation Interval.
   b. Before starting the lead boiler, the master control will first check to assure that the tank temperature is lower than the system setpoint + the stop boiler differential.
   c. After the first boiler starts, if the call is still present after the "Start Delay Time" selected from the Cascade Menu, the next boiler will start.
   d. Another boiler will start after the "Start Delay Time" is reached again until all the boilers in the system are running or until the demand is satisfied.
   e. The default value for the "Start Delay Time" is 10 seconds. Appendix C shows the Cascade Menu and the range for this parameter.
   f. Once all boilers are running, the master boiler modulates the boilers together until the tank temperature approaches the setpoint.
   g. As the DHW tank approaches setpoint, the input rates will be modulated until the modulation rate of the boilers drop below the Next Boiler Stop Rate. Then the master boiler shuts down the last boiler that started.
   h. The Calculated Setpoint Max Offset Up and Calculated Setpoint Max Offset Down are applied to individual boilers in multiple boiler cascade operation.
      - These temperature offset values are used to change the response of individual boilers to the system setpoint.
      - Increasing either of these values will cause the system to react more quickly, but may result in frequent cycling.
      - Decreasing these values will cause the system to react more slowly to achieve the setpoint.
      - By increasing the Calculated Setpoint Max Offset Up value, the Master boiler will offset individual boilers setpoint temperature by a larger amount in order to achieve the tank setpoint.
      - By increasing the Calculated Setpoint Max Offset Down value, the master boiler will decrease the boiler setpoints by a larger amount to achieve the system setpoint.
   i. The Rotation Interval is the frequency at which the master boiler will change the lead boiler in the sequence.
      - For example, if the Rotation Interval is set to 4 days and there are 4 boilers operating together the following chart shows the operating sequence over the next 25 days.

Table 8.8: Rotation Interval Sequence

Days of Operation	Start/Stop Sequence
1-5	1-2-3-4
6-10	2-3-4-1
11-15	3-4-1-2
16-20	4-1-2-3
21-25	1-2-3-4

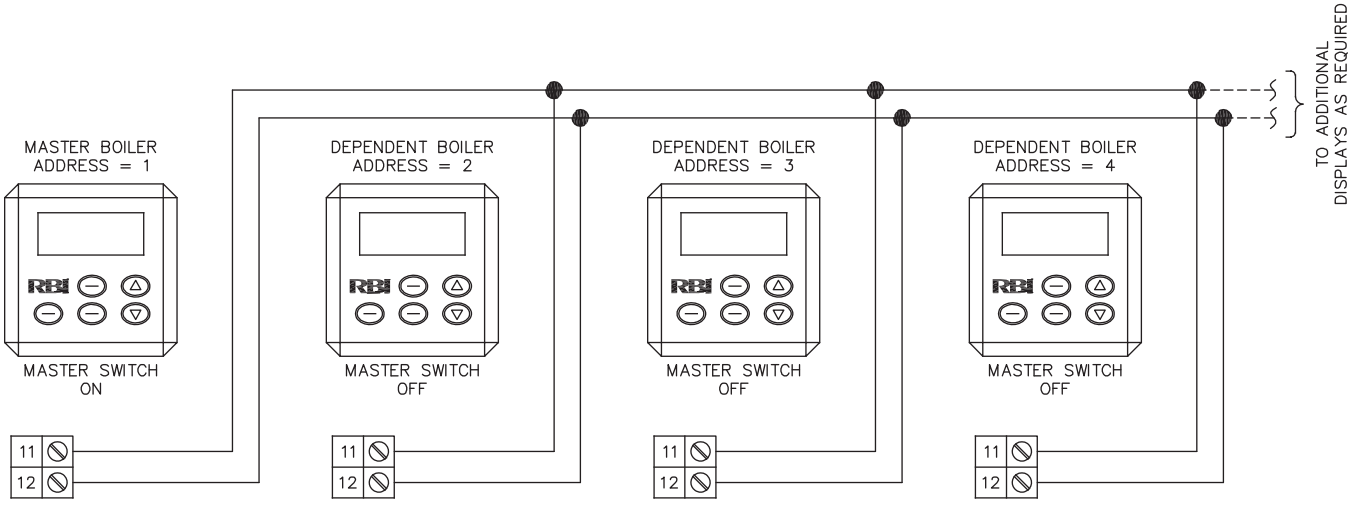


Figure 8.9

I. DEFAULTS

1. **Factory Defaults – Restore:** By pressing the "Select" key while in the "Factory Defaults" screen. All factory settings will be restored on the control.

2. **Site Defaults – Save:** To save the current settings as "Site Defaults," press the "Select" key while in the following menu.

3. **Site Defaults – Reset:** To restore the "Site Defaults," press the "Select" key while in the following menu.

9. START-UP PROCEDURE

A. GENERAL

1. Confirm that all water, gas and electricity are turned off.
2. Verify that the water piping, venting & air intake piping, gas piping, electrical wiring and electrical components are installed in accordance with the manufacturer's instructions. Be sure that the boiler is installed in accordance with this manual and good engineering practice.
3. Turn on electricity and gas to the boiler

B. CHECK WATER PIPING

1. Fill the boiler and system with water, making certain to purge all air from the system. Open each vent in the system until all air is released and water begins to be discharged. Then close the vent.
2. The pressure reducing valve on the fill line will typically allow the system to be pressurized to 12 PSI. Consult manufacturers instructions for operation of the valve and expansion tank.
3. Check joints and fittings throughout the system and repair as required.

C. CHECK GAS PIPING

1. Turn on gas to the boiler using the shut-off valve upstream of the sediment trap. Be sure that the gas shut-off valve supplied with the boiler is in the closed position.
2. Connect a manometer to the gas supply upstream of the supplied manual gas valve.
3. Confirm that the gas supply pressure to the boiler is between the minimum and maximum values as indicated in Section 5.
4. If a supply pressure check is required, isolate the boiler and gas valve before performing the pressure test. If the supply pressure is too high or too low, contact the fuel gas supplier.
5. Double check the fuel gas supply pressure after the boiler is running to be sure that the pressure doesn't drop off significantly under operation.

D. CHECK OPERATION

1. Either disconnect or set CH thermostat and DHW tank thermostat to assure that no call for heat.
2. Turn on electricity and all manual gas valves to the boiler. Check to see if the LCD display is lit. The control will display, "Standby".
3. Refer to Section 8, Boiler Control, to set up the control for the desired operation.
4. Use the ignition sequence, Figure 8.1 to follow the light off and shutdown sequences and to assist in troubleshooting operation problems. If the boiler does not function properly, consult Section 10, Troubleshooting.
5. After starting the boiler, be certain that all controls are working properly and that the combustion is properly set up. Paragraphs 6 and 7 below provide instructions on how to do this.
6. Check that the boiler will shut down when the supply water temperature reaches the control setpoint.
   a. Note the boiler setpoint by accessing the User Menu, Status Display. Press the "Menu" key on the keypad. Choose Status by pressing the "Select Key". Use the "▼" and "▲" key to scroll through the CH and DHW setpoints. Refer to Appendix B for the User Menu.
   b. Use the System Test Mode in the Installer Menu to choose High Input Power.
   c. Monitor the boiler temperature on the temperature gauge (supplied for field mounting) and on the Status display.
   d. The boiler should shut down at the boiler setpoint plus 10°F (5.6°C). If it does not shut down turn off the boiler and contact your RBI representative.
7. Check combustion readings in the boiler vent pipe.
   a. Drill and tap a 1/8" NPT threaded hole in the boiler vent pipe within 12" (305 mm) of the boiler vent connection. (21/64" Drill and 1/8" NPT Pipe Tap recommended) This is to be used as the combustion test port for the combustion analyzer, see Figure 9.1.

Figure 9.1: Drill and Tap Combustion Test Port

   b. Using a combustion analyzer with the capability to read carbon dioxide (CO_2) and carbon monoxide (CO), place the probe into the combustion test port, see Figure 9.2.
   c. Manually set the boiler to Maximum power by entering the System Test Mode, see Appendix C, Installer Menu.

Figure 9.2: Insert Analyzer Test Probe into Test Port

- Verify that the fan speed indicated is within 30 rpm of the maximum power fan speed in Table 12.2.

- Verify that the CO and CO_2 emissions are within the parameters specified in Table 5.4.

d. Manually set the boiler to Low Power by entering the System Test Mode, see Appendix C, Installer Menu.

- Verify that the fan speed indicated is within 100 rpm of the Low Power fan speed listed in Table 12.2.

- Verify that the CO and CO_2 emissions are within the parameters specified in Table 5.4.

e. If the values in either of these instances falls outside the parameters listed in Table 5.4, turn off the boiler and contact your RBI representative. For best results, the value should be set for the middle of the range (9% for Natural Gas and 10% for LP Gas).

f. Be sure to set the System Test mode to Off so that the boiler will modulate correctly in accordance with the load.

g. After removing the analysis probe from the vent pipe, insert a PVC or Stainless Steel pipe plug into the test port, see Figure 9.3.

h. Record the combustion readings on the "Start-up Combustion Record" in Appendix D. It is very important to record all of the information requested on the sheet for follow up and troubleshooting.

Figure 9.3: Insert Pipe Plug into Test Port

E. LIGHTING & OPERATING PROCEDURES

FOR YOUR SAFETY
READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU DO SMELL GAS

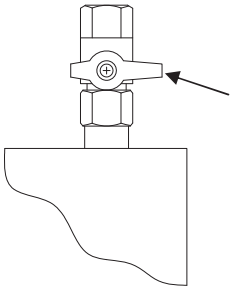
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Use only your hand to turn the gas control valve. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.



5. Turn gas shutoff valve clockwise ↻ to "OFF". Handle will be perpendicular to pipe, do not force.
6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
7. Turn gas shutoff valve counterclockwise ↺ to "ON". Handle will be in line with the pipe.
8. Turn on all electric power to appliance.
9. Set thermostat to desired setting.
10. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn the gas shutoff valve clockwise ↻ "OFF". Handle will be perpendicular to pipe, do not force.

Figure 9.1: Lighting & Operating Instructions

10. TROUBLESHOOTING

A. BLOCKING ERRORS

1. When a Blocking Error occurs the controller will display a message and an “E” error code on the display module.
2. These error messages and several suggested corrective actions are included in Table 10.1.
3. Certain Blocking Errors will, if uncorrected, become Locking Errors as described is Paragraph B.

B. LOCKING ERRORS

1. When a Locking Error occurs the controller will display a message and an “A” error code on the display module.
2. These error messages and several suggested corrective actions are included in Table 10.2.
3. Press the reset key to clear the Locking Error and resume operation. Be sure to observe the operation of the unit to prevent a recurrence of the fault.
4. The Infinite Energy control will retry for ignition after one hour of being in a lockout condition. This will prevent lockout errors from resulting in “No Heat” calls if there is an intermittent problem.
5. The Infinite Energy control logs the flame signal four times during the last 2 seconds of the ignition period. This is to aid in troubleshooting ignition errors. A flame signal below 2 micro-amps at the end of this period will result in a lockout. If the flame signal is low, remove the flame sensor and igniter for inspection. Also, be sure that the lead to the flame sensor is not grounded.

⚠ WARNING

When servicing or replacing any components of this boiler be certain that:

- **The gas is off.**
- **All electrical power is disconnected.**

⚠ DANGER

When servicing or replacing components that are in direct contact with the boiler water, be certain that:

- **There is no pressure in the boiler. (Pull the release on the relief valve. Do not depend on the pressure gauge reading).**
- **The boiler water is not hot.**
- **The electrical power is off.**

⚠ WARNING

Do not use this appliance if any part has been under water. Improper or dangerous operation may result. Contact a qualified service technician immediately to inspect the boiler and to repair or replace any part of the boiler which has been under water.

⚠ CAUTION

If overheating occurs or the gas supply fails to shut off, do not turn off electrical power to the circulating pump. This may aggravate the problem and increase the likelihood of boiler damage. Instead, shut off the gas supply to the boiler at the gas service valve.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors may cause improper and dangerous operation. Verify proper operation after servicing.

⚠ CAUTION

The convenience outlet is powered even when the service switch is off.

Table 10.1: Control Board Blocking Error Codes (automatic reset):

"E" CODE	Error Display	Internal No.	Error Description	Corrective Action
E01	SUPPLY SENSOR NOT CONNECTED	51	Supply sensor not connected.	Check harness and sensor.
E02	RETURN SENSOR NOT CONNECTED	52	Return sensor not connected.	Check harness and sensor.
E04	DHW SENSOR NOT CONNECTED	55	DHW sensor not connected.	If DHW Mode is not intended to be set to Mode 1, DHW Store with Sensor, then change it to the appropriate Mode. Check harness and sensor.
E05	STACK SENSOR OPEN	57	Flue gas sensor open.	Check vent temperature, harness, sensor.
E11	SUPPLY SENSOR SHORT	59	Supply sensor shorted.	Check harness and sensor.
E12	RETURN SENSOR SHORT	60	Return sensor shorted.	Check harness and sensor.
E13	STACK SENSOR SHORT	65	Flue gas sensor shorted.	Check harness and sensor.
E14	DHW SENSOR SHORT	63	DHW sensor shorted.	Check harness and sensor.
E19	COMMUNICATION ERROR E2PROM ERROR	0	Problems reading from or writing to e2prom.	Contact RBI Representative.
E20	FALSE FLAME DETECTED	35	False Flame detected.	Verify no flame in observation port. Check Sensor.
E21	HOT/NEUTRAL REVERSED	44	Phase and neutral of mains supply are reversed.	Verify polarity of incoming wiring. Check boiler ground and harness.
E22	POOR GROUND	43	No earth connected or internal hardware error.	Check boiler ground and harness.
E23	NET FREQUENCY ERROR	45	Mains frequency differs more than 2% from 60Hz.	Contact electrical provider and/or an electrician.
E24	POOR GROUND	46	Earth connection is not ok.	Check boiler ground and harness.
E25	BLOCKED VENT	38	Blocked Vent Switch is Open	This error applies to IEW-199 and IEW-399 models. Check for blocked vent pipe or blocked heat exchanger. Check switch and tubing to switch.
E26	BLOCKED CONDENSATE DRAIN	41	Condensate drain blocked.	Check condensate tanks, hoses, condensate switch, and harness.
E30	HIGH STACK TEMPERATURE	39	Flue gas sensor above max flue setpoint + diff.	If flue pipe is hot, check flue temperature and compare to values shown Table 8.6. Check for proper gas input and combustion readings, check for dirty heat exchanger. If flue pipe is not hot, check flue sensor and harness.
E31	LOW WATER	36	Water level is too low.	Check boiler water level, low water cut-off, harness. If a LWCO is not used, a jumper should be placed between terminals #9 and #10, LWCO Contact.
E32	HIGH RETURN TEMP	40	Return temperature is above 194°F (90°C).	Check for reversed supply and return piping or pump installed backwards.
E42	INTERNAL HDWRE ERROR	47	Internal hardware error.	Replace control.
E45	INTERNAL HDWRE ERROR	31	Internal hardware error.	Replace control.
E46	INTERNAL HDWRE ERROR	32	Internal hardware error.	Replace control.
E47	INTERNAL HDWRE ERROR	33	Internal hardware error.	Replace control.
E48	INTERNAL HDWRE ERROR	34	Internal hardware error.	Replace control.
E51	RESET BUTTON ERROR PLEASE WAIT.	66	Reset button pressed more than 7 times within one minute.	Wait five minutes. If error does not clear, replace control.

Table 10.2: Control Board Locking Error Codes (manual reset):

"A" CODE	Error Display	Internal No.	Error Description	Corrective Action
A01	IGNITION ERROR	1	Three consecutive unsuccessful ignition attempts.	1. Watch the igniter through the observation window. 2. If no spark is present, check the spark electrode for the proper 3/16" gap. 3. Remove any corrosion from the spark electrode with abrasive. 4. If spark is present but no flame, check the gas supply to the boiler. Check for high or low pressure. 5. If there is a flame, check the flame signal ignition log in the Installer Menu. If values for flame signal are less than 3.1 μA, check wiring connections and clean the harness connector at the control. 6. Determine if gas valve is opening by monitoring gas pressure. 7. Check gas presure.
A02	FLAME FAILURE	24	Three consecutive flame failures during one demand.	1. If boiler sparks, lights briefly and then goes out: a. Disconnect the flame sensor cable and then retry ignition.* b. If the flame stays lit, allow the boiler to run for several minutes and then reattach the cable.* c. If the problem persists, remove the flame sensor and inspect the burner through the sensor opening. If metal fibers are protruding from the burner, use a blunt probe to move the fibers away from the sensor. d. If the problem is still present, replace the flame sensor. 2. If the unit locks out on flame failure during normal operation: a. Check gas pressure at the inlet to the gas valve (See figure 5.2) while the boiler is operating. b. Check the flame signal in the Installer Menu under Status. This will also show the total number of flame failures. If the flame signal reads less than 2.8 μA, clean the sensor and igniter. Be sure that the wiring harness is fully seated at the control. c. If the flame signal is consistently low, check the signal with the sensor disconnected. If the flame signal improves, replace the flame sensor.
A03	OVERHEAT LIMIT OPEN	18	High Temperature Limit Open [Set Temperature: 195°F (90.5°C)]	1. Check CH, DHW, General Pump Operation 2. Assure that there is adequate flow through the boiler by checking the status menu and assuring less than 40°F (4.4°C) temperature rise across the boiler. 3. Check thermistor reading on the supply thermistor. Replace it if necessary.
A04	INTERNAL ERROR GAS VALVE RELAY	5	Gas Valve Relay Problems.	Replace control
A05	INTERNAL ERROR SAFETY RELAY	6	Safety Relay Problems.	Replace Control
A09	INTERNAL SOFTWARE ERR RAM ERROR	9	Internal Software Error.	Replace Control
A09	INTERNAL SOFTWARE ERR	27	Internal Software Error.	Replace Control
A09	INTERNAL SOFTWARE ERR	28	Internal Software Error.	Replace Control
A09	INTERNAL SOFTWARE ERR	29	Internal Software Error.	Replace Control
A09	INTERNAL SOFTWARE ERR	30	Internal Software Error.	Replace Control
A10	COMMUNICATION ERROR E2PROM ERROR	12	No Communication with E2prom.	Replace Control

* The flame is sensed through both the sensor and the igniter.

Table 10.2 (cont'd): Control Board Locking Error Codes (manual reset):

"A" CODE	Error Display	Internal No.	Error Description	Corrective Action
A12	SOFTWARE OUT OF DATE E2PROM OUT OF DATE	10	Contents of e2prom is not up-to-date.	Replace Control
A13	INTERNAL ERROR	13	Internal Software Error	Replace Control
A14	INTERNAL ERROR	14	Internal Software Error	Replace Control
A15	INTERNAL ERROR	16	Internal Software Error	Replace Control
A16	INTERNAL ERROR	22	Internal Software Error	Replace Control
A18	INTERNAL ERROR	19	Internal Software Error	Replace Control
A19	FALSE FLAME DETECTED AFTER SHUTDOWN	20	Flame signal detected 10 sec. after closing the gas valve.	1. Check flame sensor to be sure there is no short to ground. 2. Check igniter to be sure there is not short to ground. 3. This could also indicate that the gas valve doesn't close completely.
A20	FALSE FLAME DETECTED BEFORE IGNITION	21	Flame signal detected before gas valve opened.	4. Check flame sensor to be sure there is no short to ground. Check igniter to be sure there is not short to ground.
A23	FLOW_SW_NOT_OPEN	25	CH flow switch not working.	1. Check for electrical continuity between wires connected to terminals 9 & 10 from field supplied flow switch. 2. If there is continuity when the pump is off, there is a system piping or pump control problem.
A24	FLOW_SW_NOT_CLOSED	26	CH flow switch not working.	1. Check for electrical continuity between wires connected to terminals 9 & 10 from the field supplied flow switch. 2. If there is no continuity, check to be sure the pump is working. 3. If the pump is working correctly, check the flow switch.
A32	FAN NOT RUNNING	23	Internal Software Error.	
A33	FAN SPEED ERROR	8	Fan speed detected is more than 300 rpm different from targeted value for more than 60 seconds.	1. Is the fan running at full speed? • Check 4 wire control connection to blower and control. • Replace harness. 2. Is the fan running at a modulated speed? • Check 4 wire control connection to blower and control. • Replace harness. 3. Is the fan not running? • Check the 3 wire power connection to the blower and control. • Replace harness. • Replace Blower.
A50	RETURN HIGHER THAN SUPPLY	11	Boiler return water temperature higher than supply for more than 5 ignition attempts.	1. Check system piping. Assure that the water is entering the return connection and exiting the supply connection. 2. Compare the supply thermistor reading to the temperature gauge, if they don't agree, replace the supply thermistor.

C. WARNING ERRORS

The Infinite Energy boiler control will display a blinking screen under several conditions. Several of these conditions provide the error information directly on the screen. Table 10.3 shows sensor errors and corresponding corrective actions.

DHW Sensor Error:

a. If the boiler control is set to operate on DHW Mode 1 (DHW Sensor), and there is no sensor connected the boiler will not satisfy a DHW call for heat.

b. The display will blink and the DHW temperature will read 14°F (-10°C) if there is an open circuit at the sensor terminals. Pressing the "Reset" key will display the following error screen.

c. This will also occur if the wires are not properly connected.

d. If there is a short at the DHW sensor terminals and the DHW mode is set to Mode 1, the DHW system will not operate. The display will blink to indicate a warning error. Pressing the "Reset" key will display the following error screen.

Table 10.3: Control Board Warning Error Codes

"W" CODE	Error Display	Error Description	Corrective Action
#W02	 Blinking Screen – Press "Reset" key to view this message	DHW Sensor Open	1) Be sure the optional DHW Sensor (3354157) is connected. 2) Remove the wires from terminals #5 and #6 on the boiler and check the resistance between them. a. If the resistance is above 10 kΩ, check the resistance at the sensor. b. If the reading at the sensor is the same, replace the sensor. c. If the reading at the sensor is lower, replace the wiring.

11. MAINTENANCE

⚠ WARNING

Product Safety Information
Refractory Ceramic Fiber Product

This appliance contains materials made from refractory ceramic fibers (RCF). Airborne RCF fibers, when inhaled, have been classified by the International Agency for Research on Cancer (IARC), as a possible carcinogen to humans. After the RCF materials have been exposed to temperatures above 1800°F (982°C), they can change into crystalline silica, which has been classified by the IARC as carcinogenic to humans. If particles become airborne during service or repair, inhalation of these particles may be hazardous to your health.

Avoid Breathing Fiber Particulates and Dust

Suppliers of RCF recommend the following precautions be taken when handling these materials:

<u>Precautionary Measures:</u>
Provide adequate ventilation.
Wear a NIOSH/MSHA approved respirator.
Wear long sleeved, loose fitting clothing and gloves to prevent skin contact.
Wear eye goggles.
Minimize airborne dust prior to handling and removal by water misting the material and avoiding unnecessary disturbance of materials.
Wash work clothes separately from others. Rinse washer thoroughly after use.
Discard RCF materials by sealing in an airtight plastic bag.

<u>First Aid Procedures:</u>
Inhalation: If breathing difficulty or irritation occurs, move to a location with fresh clean air. Seek immediate medical attention if symptoms persist.
Skin Contact: Wash affected area gently with a mild soap and warm water. Seek immediate medical attention if irritation persists.
Eye Contact: Flush eyes with water for 15 minutes while holding eyelids apart. Do not rub eyes. Seek immediate medical attention if irritation persists.
Ingestion: Drink 1 to 2 glasses of water. Do not induce vomiting. Seek immediate medical attention.

A. GENERAL (WITH BOILER IN USE)

General boiler observation can be performed by the owner. If any potential problems are found, a qualified installer or service technician/agency must be notified.

1. Remove any combustible materials, gasoline and other flammable liquids and substances that generate flammable vapors from the area where the boiler is contained.
2. Observe general boiler conditions (unusual noises, vibrations, etc.)
3. Observe operating temperature and pressure on the combination gauge located in the supply piping on the left side of the boiler. Boiler pressure should never be higher than 5 psi below the rating shown on the safety relief valve (25 psig maximum for a 30 psig rating). Boiler temperature should never be higher than 240°F (116°C).
4. Check for water leaks in boiler and system piping.
5. Smell around the appliance area for gas. If you smell gas, follow the procedure listed in the Lighting Operating Instructions to shut down appliance in Section 9, Start-Up Procedure Part B.

B. WEEKLY (WITH BOILER IN USE)

Flush float-type low-water cut-off (if used) to remove sediment from the float bowl as stated in the manufacturer's instructions.

C. ANNUALLY (BEFORE START OF HEATING SEASON)

⚠ CAUTION

The following annual inspection must be performed by a qualified service technician.

1. Check boiler room floor drains for proper functioning.
2. Check function of the safety relief valve by performing the following test:
   a. Check valve piping to determine that it is properly installed and supported.
   b. Check boiler operating temperature and pressure.
   c. Lift the try lever on the safety relief valve to the full open position and hold it for at least five seconds or until clean water is discharged.
   d. Release the try lever and allow the valve to close. If the valve leaks, operate the lever two or three times to clear the valve seat of foreign matter. It may take some time to determine if the valve has shut completely.
   e. If the valve continues to leak, it must be replaced before the boiler is returned to operation.
   f. Check that operating pressure and temperature have returned to normal.
   g. Check again to confirm that valve has closed completely and is not leaking.
3. Test low-water cut-off (if used) as described by the manufacturer.
4. Test limit as described in Section 9, Part D, "Check Operation".
5. Test function of ignition system safety shut-off features as described in Section 9, Part D, "Check Operation".

⚠ DANGER

When servicing or replacing components, be absolutely certain that the following conditions are met:

- **Water, gas and electricity are off.**
- **The boiler is at room temperature.**
- **There is no pressure in the boiler.**

⚠ CAUTION

The convenience outlet is powered even when the service switch is off.

6. Remove the top/front jacket panel and inspect for any foreign debris that may have entered through air intake vent.
7. Inspect burner for deterioration. Replace if necessary.
8. With boiler in operation check that condensate is dripping from condensate tubing. Check for any restriction in condensate drain line.

D. CONDENSATE CLEANING INSTRUCTIONS

1. Removal of Condensate Tanks.
   a. Close manual gas shutoff valve on top of boiler and turn off power to the boiler by placing the boiler service switch to the off position.
   b. Remove the front jacket panel.
   c. Remove the wing nut securing the front tank and disconnect the tank from the upper right drain hose. (Some condensate may spill out of this port).
   d. Remove the cap from the tank and position a container in front of the boiler and tilt the tank to drain condensate into the container.
   e. Tank and lower hose may be by removed by disconnecting the lower hose from the rear tank.
   f. Clean tank and hose with water and inspect the rear tank for sediment in the lower connection port. The rear tank can be removed for cleaning if required by removing the wing nut and disconnecting the two float switch wire leads. NOTE: Special care must be taken when removing the hoses from the top of the rear tank. They must be held secure and do not pull hoses downward and away from their upper connections to the heat exchanger and vent adapter.
   g. After cleaning, replace tanks and reconnect hoses and wire leads to float switch. Fill the front tank with water and check for any leaks at connections.
   h. Replace the front jacket panel, open the manual gas valve and place the boiler service switch to the on position.

2. Before re-starting the Infinite Energy boiler follow the steps below:
   a. Reconnect the thermostat wires.
   b. Open the manual gas shutoff valve and reset the thermostats.
   c. Observe the boiler function to make sure you see a condensate flow.
   d. If you do not observe a condensate flow, repeat the above procedure.
3. If the problem is not corrected at this point, it is possible that there is a material deposit problem. Follow the Coil Cleaning Instructions (Subsection 9E) below to dissolve deposits and clean the heat exchanger.

⚠ WARNING

It is extremely important to make sure there is no blockage in the exhaust vent. Failure to do so may result in serious personal injury or death.

E. COMBUSTION CHAMBER COIL CLEANING INSTRUCTIONS

Before beginning this procedure, you must have on hand the following items:

– a nylon or brass brush (not steel)

– "Rydlyme" (recommended for best results) (available online www.rydlyme.com) or "CLR" (available at most hardware stores)

1. Shut the boiler down and access the heat exchanger using the following steps:
   a. Close the manual gas shutoff valve and wait for the unit to be cool to the touch.
   b. Disconnect the condensate piping from the outside connections (not from the Infinite Energy side) so the flow can be observed.
   c. Disconnect compression nut on gas valve inlet and disconnect the gas valve electrical connector.
   d. Remove the six 10 mm nuts from the burner plate assembly. Disconnect wire leads to the spark igniter and flame sensor. Disconnect two Molex plugs from blower motor.
   e. Pull the entire burner plate towards you to access the heat exchanger coils.
2. Using a spray bottle filled with the recommended product "Rydlyme" or "CLR", spray liberally on the coils, making sure the solution penetrates and funnels down through the condensate hose. If the condensate hose is blocked, let the chemical penetrate for at least 15 minutes or until it drains.
3. Use the nylon or brass brush (do not use steel) and scrub coils to remove any buildup, then vacuum the debris from the coils.
4. Spray coils with clear water, making sure to confine the spray to the area being cleaned (try to avoid wetting the back ceramic wall of the unit). Flush the combustion chamber with fresh water. At this point, the Infinite Energy should be ready to power back up.
5. Reinstall the burner plate assembly using the following steps:
   a. Inspect the inside of the heat exchanger for dirt and debris.
   b. Install the burner plate assembly and replace the six 10 mm nuts.
   c. Reconnect the wire leads to the spark igniter, flame sensor and gas valve. (Be sure that the spark igniter is connected to the lead with the large insulated connection boot.) Reconnect two Molex plugs on blower motor.
   d. Connect the compression nut on the gas valve inlet and reattach the gas valve electrical connector.
   e. Reset thermostats. **(IMPORTANT: BE SURE THAT THE VENT CONNECTION IS NOT BLOCKED.)**

⚠ WARNING

It is extremely important to check for leaks when reconnecting the gas valve. Failure to do so may result in severe personal injury, death or major property damage.

   f. Turn the power to the Infinite Energy on. Observe the display module to assure proper operation.
   g. Initiate a call for heat** and observe the condensate flow.
   h. Reconnect the condensate piping to the drain connection.

   ****NOTE: When firing the boiler the first few times you may experience some fluttering of the gas burner that may result in a flame lockout. This is normal and will require you to recycle the unit until this clears up. This is caused by water still present in the combustion chamber.**

6. Inspect exhaust vent and air intake vents for proper support and joint integrity. Repair as necessary. Refer to Section 5, VENTING.

⚠ WARNING

Leaks in the vent system will cause products of combustion to enter structure (vent system operates under positive pressure).

7. Inspect exhaust vent and air intake vent terminations for obstructions or corrosion. Corrosion is an indication of exhaust gas recirculation.

12. BOILER DIMENSIONS & RATINGS

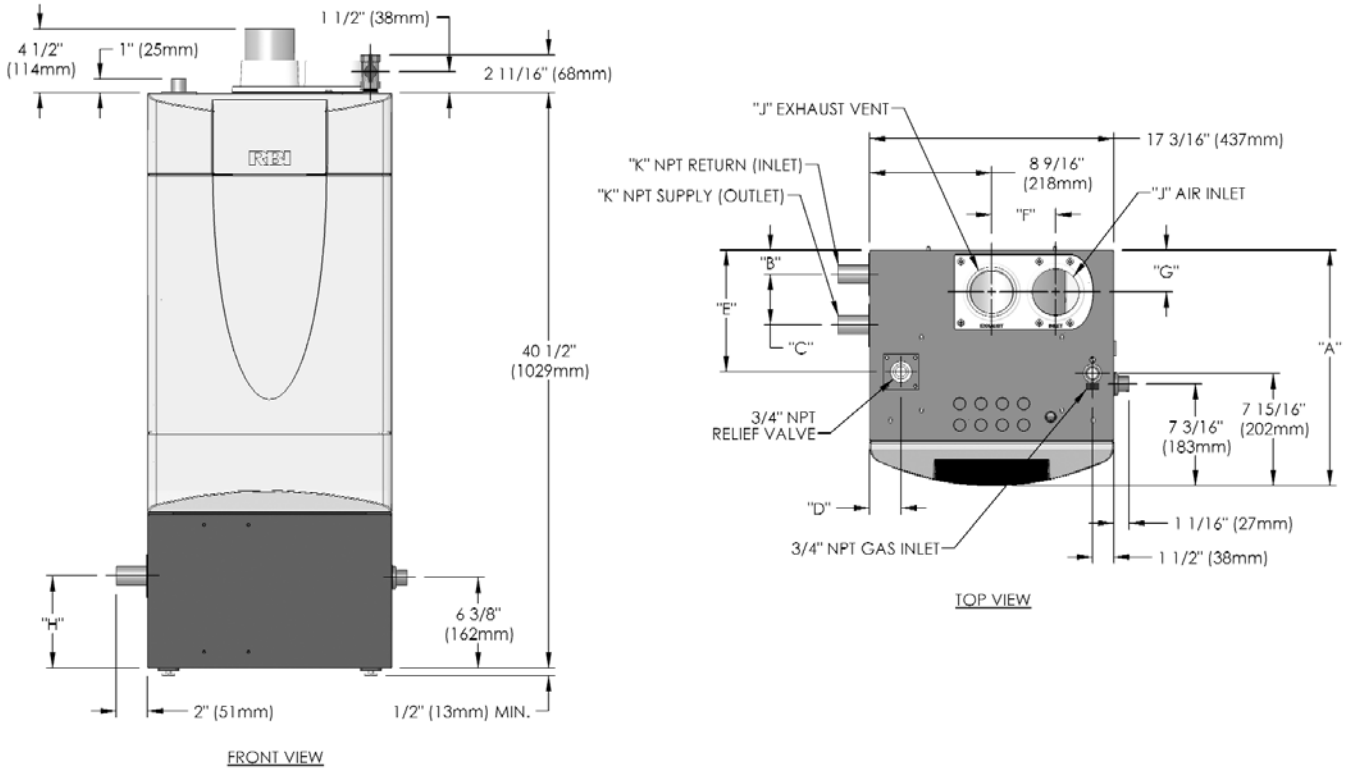


Figure 12.1: Dimensional Drawing

Table 12.1: Boiler Dimensions

SERIES INFINITE ENERGY DIMENSIONS										
Boiler Model	**"A"**	**"B"**	**"C"**	**"D"**	**"E"**	**"F"**	**"G"**	**"H"**	**"J"**	**"K"**
IEW-199	16-9/16" (421 mm)	1-3/4" (44 mm)	3-9/16" (90 mm)	2-1/4" (57 mm)	8-1/2" (216 mm)	4-1/2" (114 mm)	3" (76 mm)	6-1/2" (165 mm)	3"	1"
IEW-399	27-15/16" (710 mm)	2-3/4" (70 mm)	7-1/16" (179 mm)	2" (51 mm)	19-7/8" (505 mm)	5-1/4" (133 mm)	3-5/8" (92 mm)	5-13/16" (148 mm)	4"	1-1/2"

Table 12.2: Boiler Ratings

SERIES INFINITE ENERGY BOILER RATINGS						
Boiler Model	**Input (MBH)**		**Heating Capacity (MBH)**	**Net I=B=R Rating (MBH)**	**AFUE (%)**	
	Min.	**Max.**				
IEW-199	42	199	182	158	97.30	
			Gross Output (MBH)	**Net I=B=R Rating (MBH)**	**Thermal Efficiency (%)**	**Combustion Efficiency (%)**
IEW-399	80	399	373	324	93.4	95.5

Table 12.3: Combustion Air Fan Speeds

SERIES INFINITE ENERGY COMBUSTION AIR FAN SPEEDS				
Boiler Model	**Input Rate**	**Fan Speed**		
		Low Power	**Ignition**	**High Power**
IEW-199	199 MBH	1350	3250	5940
IEW-399	399 MBH	1710	3250	7740

Table 12.4: Infinite Energy Main Control Specifications

SERIES INFINITE ENERGY MAIN CONTROL SPECIFICATIONS	
Power Supply	120 VAC 60 Hz Nominal (102-132 VAC 58.8 – 61.2 Hz)
Fuse (5562)	5 Amp, 250 VAC
Blower Voltage	120 VAC
Gas Valve Voltage	120 VAC
Thermostat Contacts	24 VAC
DHW Contacts	24 VAC
Flame Current Limits	Minimum (running): 2.8 μA Minimum (ignition): 3.1 μA Maximum: 10 μA
Temperature Sensors	NTC Thermistors are 12 kΩ @77°F (25°C) They operate on 5 VDC Supply Sensor: 14°F (-10°C) to 244°F (118°C) Return Sensor : 14°F (-10°C) to 244°F (118°C) Flue Sensor: 50°F (10°C) to 280°F (138°C) DHW Sensor: 14°F (-10°C) to 244°F (118°C)
Standards	Europe: CE EN298 North America: ANSI Z21.20 / CSA C22.2

13. REPAIR PARTS

Repair parts are available from your local RBI distributor.

Note: Remember to include the boiler model number and serial number when ordering parts.

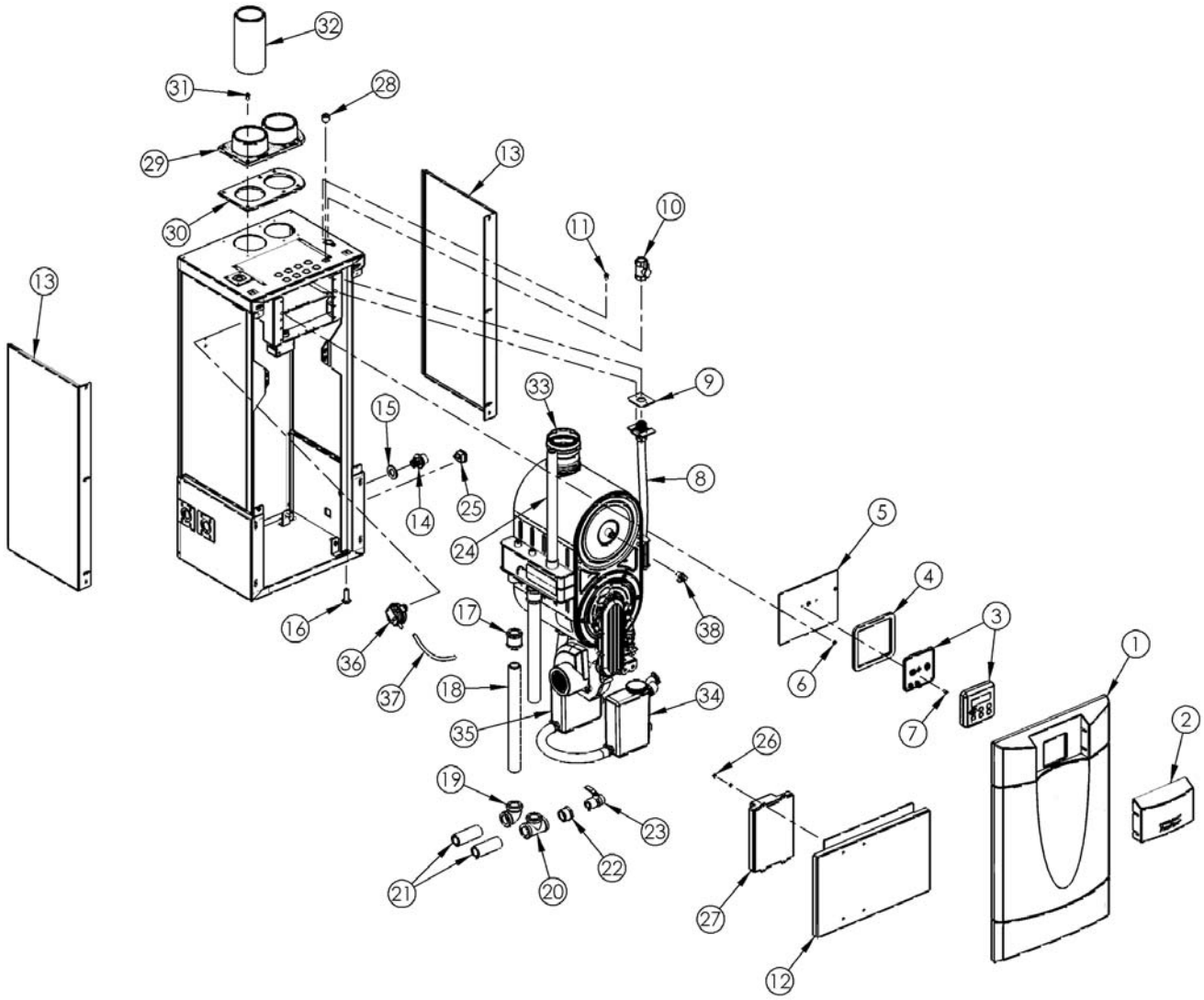


Figure 13.1: General Repair Parts

Table 13.1: General Repair Parts – IEW-199 & IEW-399

	Description	Quantity Required (199)	Quantity Required (399)	Stock Code
1	Panel, Jacket Front Door, with Ball Studs	1	1	3354256
2	Lens for Jacket Front Door	1	1	3354273
3	Display Module, Argus 852RC	1	1	3354277
4	Gasket for Display Bracket	1	1	3351453
5	Bracket for Display Module	1	1	332007-1
6	Hex Nut, #6-32 with Lockwasher	2	2	3351553
7	Screw, #6-32 x 1/2" LG Phillips Head	2	2	335449
8	Flexible Gas Line 3/4"	1		3354261
			1	3354262
9	Gasket for Gas Line	1	1	3354142
10	Manual Shut-off Valve, 3/4" NPT	1	1	3354210
11	Screw, #10 x 1/2" LG Hex. Hd.	2	2	3399992
12	Jacket, Lower Front Panel	1	1	336001
13	Jacket Side Panel Left	1		336005
			1	336010
	Jacket Side Panel Left	1		336006
			1	336011
14	Bulk Head Fitting for Condensate Hose	1	1	3354140
15	Gasket for Bulk Head Fitting	1	1	3354134
16	Leg Leveler	4	4	335429
17	Coupling, 1" NPT Brass	2		335534
	Coupling, 1-1/2" NPT Brass		2	335551
18	Nipple, 1" NPT x 14" LG Brass	2		335557
	Nipple, 1-1/2" NPT x 14" LG Brass		2	335550
19	Elbow, 1" NPT Brass	1		335558
	Elbow, 1-1/2" NPT Brass		1	335553
20	Tee, 1" NPT Brass	1		335537
	Tee, 1-1/2" NPT Brass		1	335554
21	Nipple, 1" NPT x 3" Brass	2		335559
	Nipple, 1-1/2" NPT x 3" Brass		2	335552
22	Reducing Bushing, 1" x 3/4" NPT Brass	1		335539
	Reducing Bushing, 1-1/2" x 3/4" NPT Brass		1	335556
23	Shut-off Valve, 3/4" NPT Brass	1	1	3350756
24	Nipple, 3/4" NPT x 16" LG Brass	1	1	335560
25	Convenience Outlet	1	1	3354136
26	Hex. Nut, #8-32 with Lockwasher	4	4	3351573
27	Control Module	1		3354288
			1	3354289
28	Switch, Round Toggle, 120 VAC	1	1	336049
29	Vent / Air Inlet Adapter, 3"	1		3354200
	Vent / Air Inlet Adapter, 4"		1	3354201
30	Gasket, Vent Adapter, 3"	1		3354216
	Gasket, Vent Adapter, 4"		1	3354217
31	Screw, #10 x 3/4" LG Phillips Pan Hd. Type A Zinc	6	6	335611
32	Vent Pipe, 3"	1		3354221
	Vent Pipe, 4"		1	3354220
33	Heat Exchanger Vent Adapter, 3"	1		335531
	Heat Exchanger Vent Adapter, 4"		1	335532
34	Condensate Neutralizer Assembly	1	1	3354204
35	Condensate Receiver Assembly	1	1	3354259
36	Blocked Vent Switch (includes reference #37 & 38)	1	1	3354260
37	3/16" ID Tubing x 12" Long	1	1	335563
38	90° Barbed Elbow Adapter Fitting	1	1	335564
–	Wiring Harness, Power (Right Terminal Block)	1	1	337022
–	Wiring Harness, Control (Left Terminal Block)	1	1	337021
–	Wiring Harness, Gas Valve & Flame Sensor	1	1	337023
–	Wiring Harness, Ground Wire	1	1	337024
–	Push-on Terminal Block (Field Wiring) 10-pole	2	2	335450
–	Push-on Terminal Block (Field Wiring) 6-pole	2	2	335547
–	Ignition Cable	1	1	3354115
–	T & P Relief Valve	1	1	3354274
–	Flue Sensor, 12kW	1	1	3354209
–	Flue Sensor Grommet	1	1	335023
–	Supply Sensor	1	1	3354110
–	Return Sensor	1	1	3354109

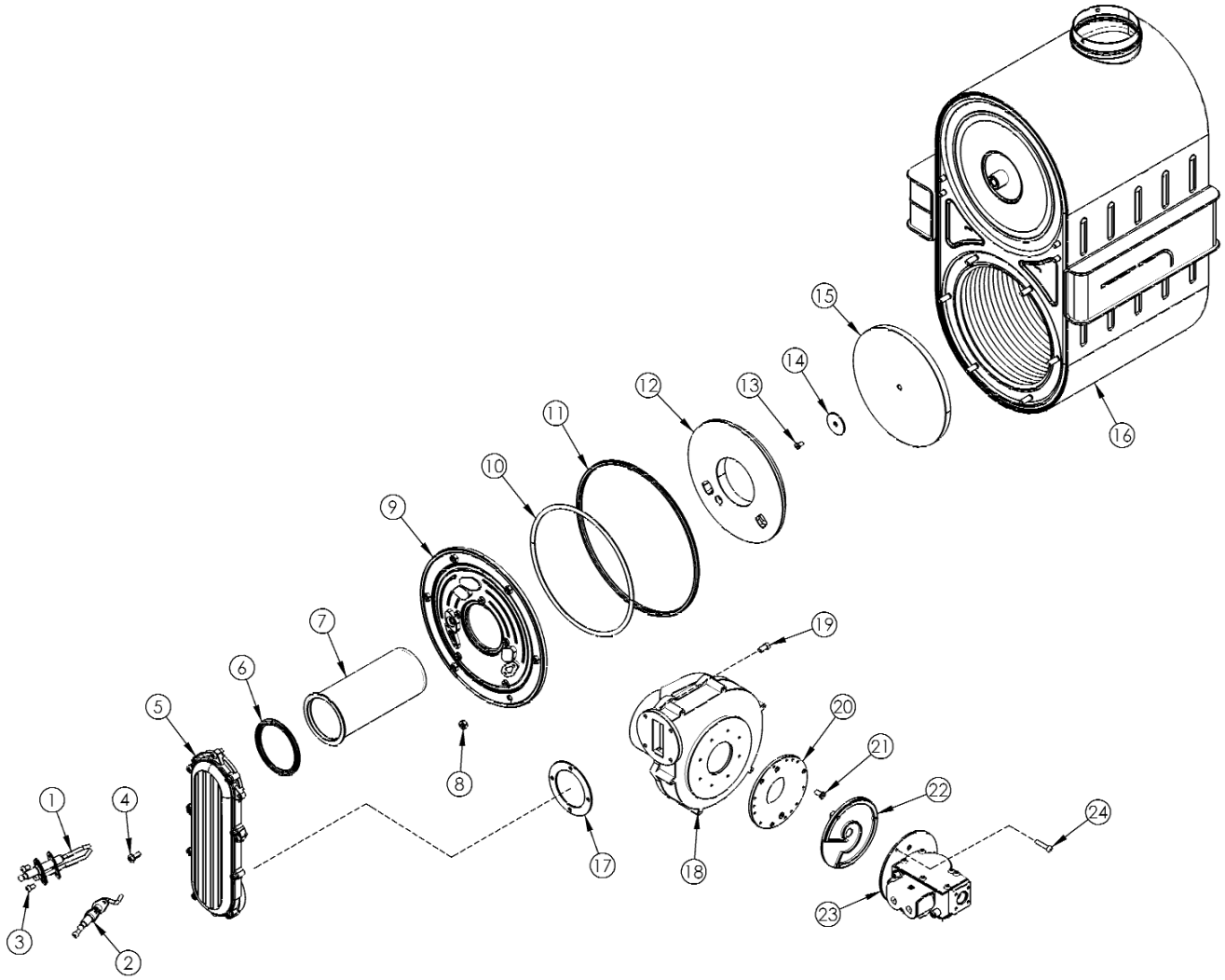


Figure 13.2: Heat Exchanger/Burner Assembly Repair Parts

Table 13.2: Heat Exchanger/Burner Assembly Repair Parts

	Description	Quantity Required (199)	Quantity Required (399)	Stock Code
1	Ignitor, with Gasket	1	1	3354246
2	Sensor, with Gasket	1	1	3354247
3	Screw, M4 x 8 mm	4	4	—
4	Screw, M5.5 x 14 mm, Fine Thread (0.5)	5	5	—
5	Premix Channel	1		3354249
			1	3354250
6	Gasket, Channel to Burner	1	1	3354186
7	Burner	1		3354263
			1	3354264
8	Nut, M6, Fine Thread	6	6	—
9	Combustion Chamber Cover Plate, includes items #10-#12	1	1	3354248
10	Gasket, Glass Rope	1	1	3354188
11	Gasket, Rubber	1	1	3354187
12	Insulation, Combustion Chamber Cover Plate	1	1	3354255
13	Screw, M4 x 8 mm, Stainless	1	1	—
14	Washer, Stainless	1	1	—
15	Insulation, Target Wall	1	1	3354185
16	Heat Exchanger	1		335529
			1	335530
17	Gasket, Blower to Channel	1	1	3354122
18	Blower	1		3354258
			1	3354257
19	Screw, M5 x 12 mm	4	4	—
20	Blower Adapter Plate	1		335421
			1	335610
21	Screw, M4 x 10 mm	3	3	—
22	Swirl Plate	1		3354251
			1	3354252
23	Gas Valve (includes reference #22)	1		3354253
			1	3354254
24	Screw, M4 x 25 mm	3		—

Table 13.3: Optional Accessories

	Description	Quantity Required (199)	Quantity Required (399)	Stock Code
NS	PVC Concentric Termination – 3"			3391403
NS	Stainless Steel Concentric Termination – 3"			3354161

APPENDIX A. STATUS SCREENS

Status Display

RBI INFINITE ENERGY Initialization Screen: This screen is displayed when power is first supplied to the boiler. The software version, indicated by xxxx, indicates the version of the program for the interface module. This information should be noted if contacting RBI for technical support.

Status Display Screen : Under normal conditions with no call for heat, the display on the user interface module will show that the boiler is in "STANDBY" mode. In addition, the current time, in 24 hour format, will be displayed in the upper right corner. The temperature of the Tank (CHW Mode 1) or Supply (DHW Mode 2) is shown in the lower right corner of the display depending on the DHW Mode.

Domestic Hot Water Demand

Domestic Hot Water (DHW) Trial for Ignition: Depending on the DHW mode, either a contact closure between terminals #5 and #6 or a drop in DHW temperature triggers a call for domestic hot water. Similarly to the CH demand, the display shows that the heat demand is for domestic hot water and that a trial for ignition has been initiated. The ignition cycle is shown in Table 8.1.

Domestic Hot Water (DHW) Demand: When the burner is on, the display continues to show the DHW demand. On the lower left, the percentage of modulation is shown. This screen also shows the time, in 24 hour format. The actual tank temperature (DHW Mode 1) or the boiler supply temperature (Mode 2) is shown in the lower right corner.

Supply at Setpoint

Supply at Setpoint - Fan Post Purge: If the boiler supply temperature exceeds the desired target (either a setpoint or a target calculated by the heating curve) the display will indicate "SUPPLY AT SETPOINT" and show that the boiler has entered the post purge period. After the postpurge, the display will indicate that the boiler circulator (CH PUMP) is operating. The boiler circulator will continue to operate until the demand is satisfied.

Special Demand Functions

Freeze Protection: If the supply or return temperature drops below the freeze protection setpoint the general pump is activated. If the temperature continues to drop by more than 9°F (5°C) the burner fires at minimum power and continues until the return temperature increases by 18°F (10°C).

Store Warm Hold: When using a DHW tank sensor, the hot water supply boiler control can detect if the DHW heat demand is required only to overcome the heat loss and not a result of a hot water draw. In this instance, the burner will fire at low power (1%) and continue until the tank setpoint is satisfied.

Ignition/Flame Failure Handling

Ignition Failure: If control does not sense a flame at the end of the ignition period, the display will show "No Ignition" and the control will advance to the "Post Purge" period. The control will then repeat the Ignition Cycle. If there are three successive ignition failures, the control will lock out.

Flame Failure: If the control senses a flame at the beginning of the "Burner On" period and then later loses the signal, a Flame Failure will result. This failure causes the control to advance to the "Post Purge" period. The control will then repeat the Igntion Cycle. If there are three successive flame failures the control will lock out.

Ignition Retry: If the control recycles due to Igntion or Flame Failure, "Igntion Retry" will be shown below the text indicating the source of the heat demand..

Error Handling

Blocking Error: "Blocking Error" is displayed whenever a condition is reached that prevents the boiler from operating but will not result in a control lockout. Once the condition is corrected, the control will reset automatically. A list of blocking errors is included in Table 10.1.

Lockout Error: "Lockout Error" is displayed whenever a condition is reached that results in a control lockout. After the condition is corrected, the control requires the reset button to be pushed in order to resume operation. A list of lockout errors is included in Table 10.2.

Service Notification

Service Indicator: Predetermined service intervals can be programmed into the control to prompt end users to call for routine service. This interval can be set to "TIME", "HRS" or "CYCLES" in the Installer Menu.

APPENDIX B. USER MENU

User Menu

```
MENU
→Status
 Settings
 Messages
```

The user menu is accessed by pressing the "Menu" key. Use the up/down arrow keys to identify the desired option. Then press the "Select" key to choose that option.

Status

```
STATUS

 Current Supply
 Setpoint          160°F▼
```

This screen is displayed when the DHW Mode is set to Mode 1: DHW Tank with sensor. This shows the tank temperature setpoint.

```
STATUS

 Current Supply
 Setpoint          160°F▼
```

This screen is displayed when the DHW Mode is set to Mode 2: DHW Tank with Tstat. This shows the boiler supply temperature setpoint.

```
STATUS                  ▲
 Supply      160°F
 Return      130°F
 DHW         160°F      ▼
```

```
STATUS                  ▲
 System      160°F
 Vent        130°F
                        ▼
```

```
STATUS                  ▲
 General Circ.    Off
 DHW Circulator   Off
```

Settings

```
SETTINGS                ▲
 DHW Supply Offset
      Offset:   18°F
   Boiler SP:  138°F    ▼
```

Range: 0 °F to 36 °F **Default:** 18 °F
0 °C to 20 °C 10 °C
Controls the boiler supply setpoint as an offset value from the tank setpoint. See Section 8 for more detail.

```
SETTINGS                ▲

 DHW Tank Setpoint
                 120°F  ▼
```

Range: 50 °F to 194 °F **Default:** 120 °F
10 °C to 90 °C 49 °C
Controls DHW tank setpoint. This screen is only visible in DHW mode 1.

```
SETTINGS                ▲

 DHW Boiler Setpoint
                 180°F  ▼
```

Range: 50 °F to 194 °F **Default:** 180 °F
10 °C to 90 °C 82 °C
Controls boiler supply setpoint for DHW call for heat. This screen is only visible in DHW mode 2.

```
SETTINGS                ▲
 Time & Date
 Monday
 10 May 2012   16:02    ▼
```

```
SETTINGS                ▲

 Temperature Units
      Fahrenheit °F     ▼
```

Range: °F or °C **Default:** °F

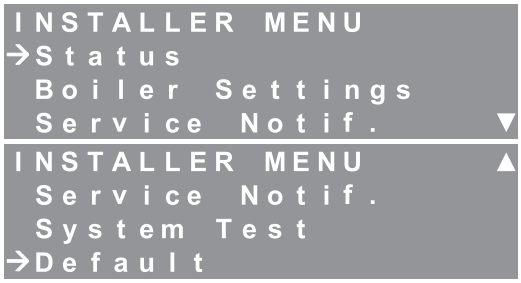
Messages

The first screen displays the last locking error and how long ago it occurred.

The second screen displays the last blocking error and how long ago it occurred.

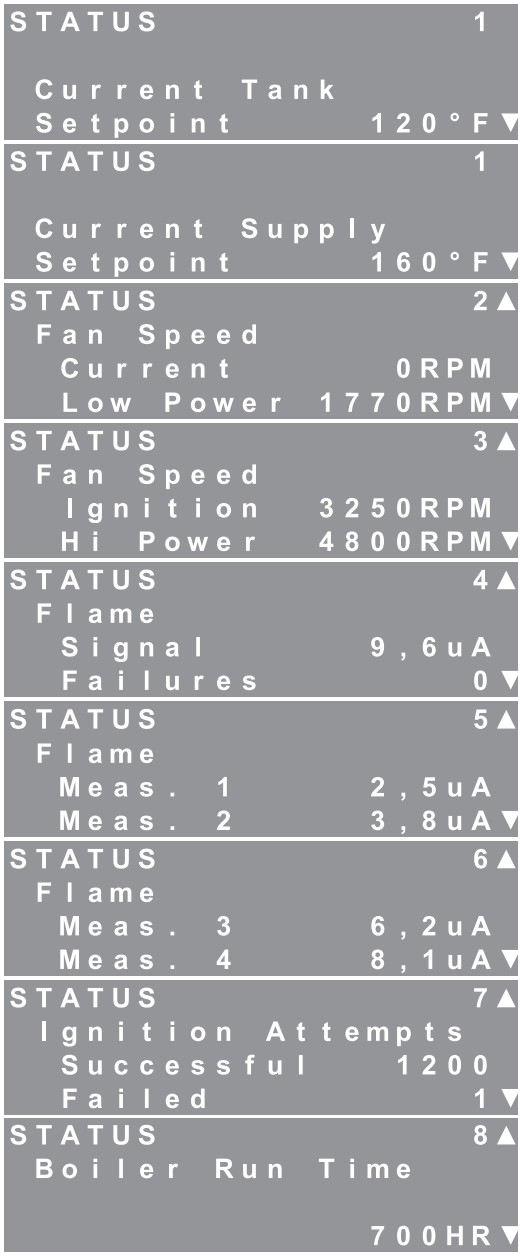
APPENDIX C. INSTALLER MENU

Installer Menu



To access the Installer Menu, press and hold the "Menu" and "Select" keys simultaneously for 10 seconds. The first screen shown to the left of this text will appear. Press the up/down arrow keys to identify the desired menu option. The ▼ or ▲ symbol on the right of the screen indicates that more menu choices can be accessed by continuing to press the down or up arrow respectively. Pressing the "Select" key chooses the option.

Status



Screen #1 shows the current tank setpoint temperature when the DHW Mode is set to Mode 1 and the current supply setpoint when the DHW Mode is set to Mode 2. This value will change when changes are made to the tank setpoint temperature (Mode 1) or the boiler supply temperature (Mode 2).

Screens #2 & #3 display fan speed information. Current fan speed will vary during operation, while the Low Power, Ignition, and Hi Power fan speeds are preset at the factory for a the particular model size. Table 12.2 in Section 12 of this manual shows the fan speed presets for each model size.

Screen #4 shows the Flame Signal and the total number of Flame Failures that have occurred on the unit. Note that the refresh rate of the Flame Signal value may be several seconds so the flame signal value may not be accurate.

Screens #5 & #6 show the flame signal values during the last 2 seconds of the previous ignition sequence. These values are logged in 1/2 second intervals to allow service personnel to troubleshoot ignition issues.

Screen #7 displays the total number of successful and unsuccessful ignition attempts that have occurred on the boiler.

The total boiler run time is recorded on screen #8

Status (continued)

Screen #9 shows the last blocking error and the time since its occurance. The code number is shown at the top of the screen and the blocking error description is at the bottom. The last 15 blocking errors can be seen by pressing the "Select" key. See Section 8 for mor information.

Screen #10 shows the last locking error and the time since its occurance. The last 15 locking errors can be accessed by pressing the "Select" key and using the up and down arrows. See Section 8 for more information.

Boiler Settings

Range: **1** to **4** **Default:** **1**

DHW Modes are used to choose between DHW Tank with either Temp. Sensor (Mode 1) or Thermostat (Mode 2). Section 8.C.1 provides more information.

Range: **0** sec to **255** sec **Default:** **15** sec

Limits the maximum time the control allows the DHW pump to post purge before the supply and return temperatures equalize. Section 8 C.2 provides detail on this function.

Range: **0** °F to **18** °F **Default:** **4** °F
0 °C to **10** °C **2** °C

Sets the temperature difference between supply and return at which the DHW pump will discontinue its pump post purge. Section 8.C.3 provides more details.

Range: **USA** or **CAN** **Default:** **USA**

Provides location code information to the control for setting the vent limit temperature. Reference section 8.C.4 for further explanation

Range: **PVC, CPVC, POLYPROPYLENE** **Default:** **PVC**

Provides vent material information to the control for setting the vent limit temperature. Reference section 8.C.4 for further explanation

Range: **45** °F to **56** °F **Default:** **50** °F
7 °C to **13.3** °C **10** °C

Reference section 8.C.5 for an explanation of the Freeze Protection Function.

Range: **LowWaterCO** or **FlowSwitch** **Default:** **LowWaterCO**

Reference Section 8.C.6 for an explanation of the Additional Safety Functions.

Range: **30** sec to **120** sec **Default:** **30** sec

Allows installer to increase postpurge time. Reference section 8.C.7 for an explanation of the Blower Postpurge time Function.

Service Notification

This screen allows the installer to reset the notification timers and counters. As the screen indicates, pressing the "Select" key will reset these values. After the "Select" key is pressed, the screen displays, "Done" in place of "Reset."

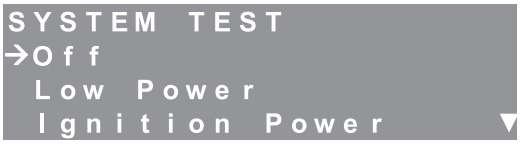
Range: Off, HRS, CYCLES, DATE **Default:** Off
This screen allows the installer to choose the method of Service Notification or to disable Service Nofification. Reference section 8.D for more information.

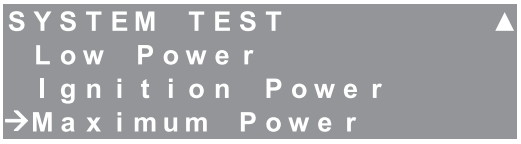
Range: 0 hrs to 8000 hrs **Default:** 4000 hrs
Settable in 100 hr increments
"SERVICE" will appear in the upper left of the main status screen after the number of hours displayed is exceeded.

Range: 0 cyc to 50,000 cyc **Default:** 20,000 cyc
Settable in 1000 cyc increments
"SERVICE" will appear in the upper left of the main status screen after the number of cycles displayed is exceeded.

This screen allows the installer to set the date that the "SERVICE" notification will appear. Using the up/down arrow keys, the Day, Month, and Year can be selected. The date will appear as folows: 01 JAN 2008

System Test





The System Test mode allows the user to force the control to operate at Low Power, Igntion Power, or Maximum Power for service and troubleshooting purposes. The boiler must have a call for DHW to allow it to run in system test. If the supply or tank temperatures exceed the setpoint the boiler will shut down.

Default Settings

Pressing the "Select" key while viewing this screen allows the installer to reset all values to the factory default settings.

Pressing the "Select" key while viewing this screen allows the installer to save all current values as stte default settings.

Pressing the "Select" key while viewing this screen allows the installer to reset all values to the site default settings.

Cascade Settings

Range: 0 to 16 **Default:** 0
This screen allows the installer to choose the hierarchy of the boiler. The default value (0) indicates no cascade function is applied, (1) = Master and (2-16) = Slave

Range: 10 sec to 240 sec **Default:** 10 sec
This screen allows the installer to choose the delay time before the next boiler in the sequence is called forf. The default for this value is 10 seconds.

Range: 1 min to 15 min **Default:** 2 min
This screen allows the installer to choose the delay time before the last boiler in the sequence is turned off. The default for this value is 2 minutes.

Range: 1 °F to 45 °F **Default:** 18 °F
This screen allows the installer to choose the temperature difference below which the last boiler in the sequence will stop after the selected delay time.

Range: 0 °F to 36 °F **Default:** 18 °F
This is an offset temperature applied to the setpoint of Dependent boilers that the control uses to adjust system response. Higher values increase system response.

Range: 0 °F to 36 °F **Default:** 9 °F
This is an offset temperature applied to the setpoint of Dependent boilers that the control uses to adjust system response. Higher values increase system response.

Range: 5 % to 40 % **Default:** 9 %
This screen allows the installer to choose the input level at which the boilers that are running should be before the last boiler in the sequence will stop.

Range: 0 Days to 30 Days **Default:** 5 Days
This screen allows the installer to choose the rotation cycle of the lead boiler. When this time limit is reached, the boiler with the lowest run hours will be chosen as lead. Choosing 0 disables rotation.

APPENDIX D. 852-1 INTERFACE ADAPTER

A. OVERVIEW

The 852-1 Interface Adapter is designed to allow for electronic interface between the Infinite Energy main control and other electronic devices.

1. **Alarm Output:**
   In the event of a blocking or locking error, the 852-1 Interface adapter will provide a contact closure to signal an external device (alarm bell, phone dialer, etc.) of a problem.

   For multiple boiler (cascade) installations, a single 852-1 Interface can be used to signal an error with any boiler in the system. The control is to be connected only to the Master boiler.

2. **Analog Input:**
   The 852-1 Interface Adapter will accept an analog input of 0-10 VDC to control the supply setpoint temperature. This signal is typically provided by a Building Automation System.

   For multiple boiler installations only one 852-1 Interface Adapter is required. The Interface Adapter should be connected to the Master boiler in the cascade system.

3. **Modbus Interface:**
   The 852-1 Interface Adapter allows external access to boiler status information using MODBUS RTU protocol. This provides remote access to Temperatures, Operating Status and Error Information as applicable.

   One 852-1 control is required for each boiler to which Modbus communication is desired. In a multiple boiler cascade control configuration, each boiler must be equipped with a 852-1 Interface Control to allow full communication.

   a. Temperatures: Supply, Return, DHW and Vent Temperatures can be monitored.

   b. Operating Status: The boiler status can be monitored to determine if the boiler is in Standby, Prepurge, Ignition, Firing, Postpurge or Alarm conditions.

   c. Error Information: If the boiler is in a lockout or blocking error, the interface will allow access to the error code.

B. PRE-INSTALLATION

1. IE-199 & IE399 boilers come equipped with pre-wired harnesses to connect the 852-1 Interface Adapter. If Modbus is required, two additional wires (provided with the kit) must be connected as shown in Figure 2.

2. For stand alone boilers, one 852-1 Interface Adapter is required for each unit. For multiple boiler installations, one 852-1 Interface Adapter will provide Alarm information, Setpoint control, and/or Modbus interface for the system. If individual boiler information is required, an interface unit is required for each of them.

3. The 852-1 Interface Adapter is designed to fit within the Infinite Energy boiler jacket. This manual will provide suggested mounting locations and wiring diagrams.

C. INSTALLATION

1. Figure 1 shows the suggested mounting location for the 852-1 Interface Adapter on the IE-199 and IE-399 boilers.
   - These boilers come equipped with pre-wired harnesses to connect the 852-1 Interface Adapter. If Modbus is required, two additional wires (provided with the kit) must be connected as shown in Figure 2.

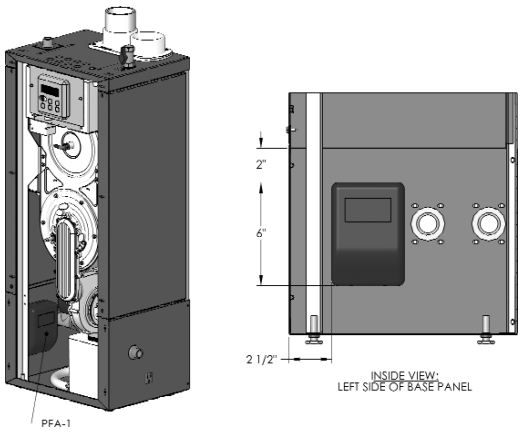


Figure 1

2. Attach 852-1 Adapter to jacket panel using adhesive-backed Velcro provided with the kit.

D. ELECTRICAL – WIRING

1. Figure 2 shows customer wiring connections for the 852-1 Interface Board.

2. IE-199 & IE-399 boilers are equipped with harnesses that provide power and communication to the Interface Board, and alarm contact output to the boiler terminal strip. Connect alarm to boiler terminal strip.

3. **Analog Input (where used):**
   For the IE-199 and IE-399, connect the analog input device to terminals #15 (+) and #16 (-) on the boiler terminal strip located behind the remote control display.

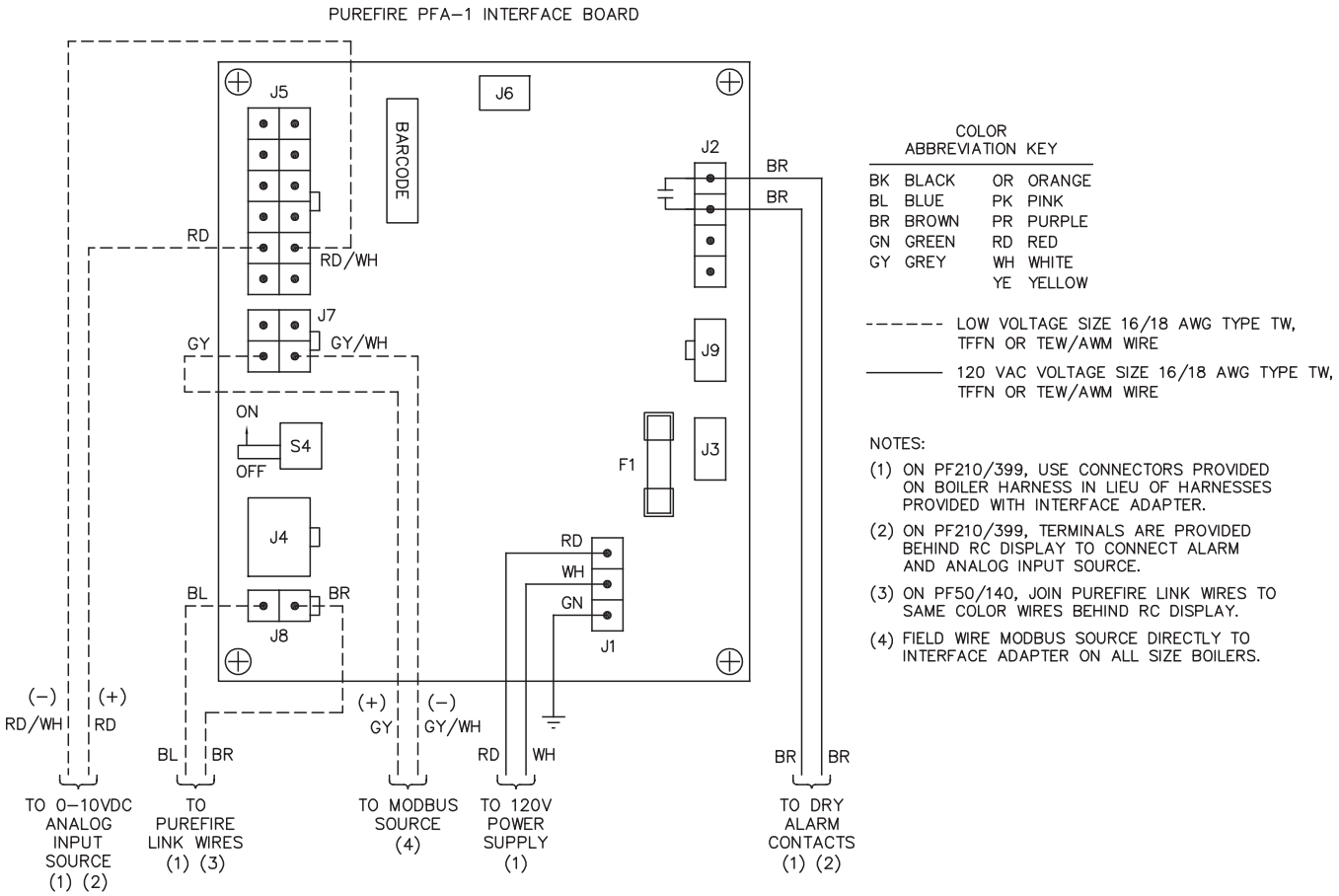


Figure 2: Electrical Wiring

E. OPERATION – ALARM CONTACTS

Alarm Output:

a. The alarm output is a normally open dry contact. If an error is sensed in one of the attached boilers, the Alarm Output contact closes.

b. This output can be used with either line voltage or 24 volts to power a lamp, buzzer, phone dialer or building management system.

F. OPERATION – ANALOG INPUT

For external control of setpoint temperature or input rate of an Infinite Energy Boiler, a 2-10 volt dc analog signal is to be applied as shown in Figure 2 to the analog input wires.

⚠ NOTICE

If the analog input is not connected and there is no connection between the red and red/white Analog Input wires, the default input voltage is 2.5 Vdc. Therefore, the boiler will likely run without an analog input signal. In this case, all of the standard limits and safety switches will continue to function properly.

Input voltage below 2 volts dc will disable boiler operation. 2 volts corresponds to a boiler setpoint temperature of 60°F and 10 volts corresponds to a boiler setpoint temperature of 200°F. Input voltage between 2 and 10 volts will result in a boiler setpoint temperature proportional to the difference between the 2 volt temperature and the 10 volt temperature. For example, an input of 6 volts will result in a boiler setpoint temperature of 130°F.

G. OPERATION – MODBUS INTERFACE

1. **Modbus Configuration:**
   The table below summarizes the Modbus configuration details:

Table 1

Modbus Configuration Specifications	
Protocol	Modbus RTU
Default Address	0x01 (settable with SiteVision)
Supported Commands	• Read Holding Registers (0x03)* • Write single holding register (0x06)
Baud Rate	9600 bps
Data Length	8 bits
Parity	None
Stop Bits	1
Physical Layer	RS485 (2 wire)
Modbus 1 A Connection	J7-1
Modbus 1 B Connection	J7-3
Buffer Size	8 registers per frame

2. **Modbus Holding Registers:**
   Modbus communicates using "words" (the contents of 16 bit holding registers). The 852-1 Interface Adapter organizes the data in read-only holding registers. Table 2 shows the information that is available for reading and the address of the holding registers. Depending on the type of Modbus software used, the holding register addressing range starts at either 0x0000 or 0x0001.

   The values of STATE and ERROR_NUMBER can be used to determine whether the boiler control is operating correctly, not communicating or in an error state.

Table 2

Modbus Holding Registers (Read Only)					
Item Index		**Parameter Name**	**Address & Holding Registers**		**Notes**
Word	**byte**		**Range Start 0x0000**	**Range Start 0x0001**	
0 High byte	0	STATE	0x0000	0x0001	See Table 3
0 Low byte	1	STATUS	0x0000	0x0001	See Table 4
2 High byte	2	ERROR_NUMBER	0x0002	0x0003	See Table 6
2 Low byte	3	WARNING_NUMBER	0x0002	0x0003	See Table 7
4 High byte	4	FLOW_TEMP*	0x0004	0x0005	$°C = \frac{\text{byte value}}{2} - 10$ $°F = \frac{°C \times 9}{5} + 32$
4 Low byte	5	RETURN_TEMP	0x0004	0x0005	
6 High byte	6	DHW_TEMP	0x0006	0x0007	
6 Low byte	7	FLUE_TEMP	0x0006	0x0007	
8 High byte	8	NOT USED	0x0008	0x0009	
8 Low byte	9	NOT USED	0x0008	0x0009	
10 High byte	10	APPLIANCE_TYPE	0x000A	0x000B	—
10 Low byte	11	CONTROL_CONFIG_BYTE	0x000A	0x000B	—
12 High byte	12	NOT USED	0x000C	0x000D	—
12 Low byte	13	DHW_MODE	0x000C	0x000D	—
14 High byte	14	NOT USED	0x000E	0x000F	—
14 Low byte	15	DHW_SETPOINT	0x000E	0x000F	—

* FLOW_TEMP is the boiler supply (outlet) water temperature.

To read these values, issue a Modbus command to read a holding register. For example, if a command is issued to read 0x0000 the resulting, unsigned word may read, "0x090F". The high byte for this word is "0x09". Table 3 shows that this value indicates that the burner is on. The low byte for this word is "0x0F". This indicates that the boiler is on as a result of the freeze protection algorithm as shown in Table 4.

Table 3

Control State Descriptions			
STATE		State Name	Description
Decimal	Hexadecimal		
0	0x00	RESET_0	Initialization
1	0x01	RESET_1	Initialization
2	0x02	STANDBY_0	Standby waiting for heat demand
3	0x03	SAFETY_ON	Ignition Sequence
4	0x04	SAFETY_OFF	Ignition Sequence
5	0x05	PRE_PURGE	Ignition Sequence
6	0x06	PRE_PURGE_1	Ignition Sequence
7	0x07	IGNIT_0	Ignition Sequence
8	0x08	IGNIT_1	Ignition Sequence
9	0x09	BURN_0	Following Boiler Demand
10	0x0A	POST_PURGE_0	Purging Combustion Chamber
11	0x0B	POST_PURGE_1	Purging Combustion Chamber
12	0x0C	PUMP_CH_0	Following CH Demand w/o Heat Input
13	0x0D	PUMP_CH_1	Post Purge Pumping after CH Demand
14	0x0E	PUMP_HW_0	Following DHW Demand w/o Heat Input
15	0x0F	PUMP_HW_1	Post Purge Pumping after DHW Demand
16	0x10	ALARM_1	Error Handling
17	0x11	ERROR_CHECK	Error Handling
18	0x12	BURNER_BOOT	Controller (re)start
19	0x13	CLEAR_E2PROM_ERROR	Error Handling
20	0x14	STORE_BLOCK_ERROR	Error Handling
21	0x15	WAIT_A_SECOND	Error Handling

The following example describes how to read the temperature holding registers (byte 4-7 and 14-15). The boiler supply and return temperatures can be read by issuing a Modbus command to read holding register “0x0004”. If the word value returned is “0x1D17”, then we know that the high byte is “0x1D” and the low byte is “0x17”. Converting 1D to decimal, we get 29. Using the formula above to convert to degrees Celsius we get, 4.5°C (40°F). Similarly, the return temperature is found by converting the hexadecimal 17 to decimal 23. Using the formula above, this is equivalent to 1.5°C (35°F).

Table 4

Control Status Descriptions			
STATUS		Status Name	Description
Decimal	Hexadecimal		
0	0x00	STANDBY	Standby waiting for Heat Demand
14	0x0E	BLOCK	Error Handling
10	0x0A	ALARM	Error Handling
15	0x0F	FROST_PROTECT	Freeze Protection Demand
16	0x10	CH	Central Heating Demand
17	0x11	RESET_STATE	Initializing
18	0x12	STORAGE	DHW Demand
19	0x13	Not Applicable	Not Applicable
20	0x14	Not Applicable	Not Applicable
21	0x15	STORE_WARM_HOLD	DHW Demand (Store Warm Hold)

Table 5

Determination of General Control Status		
Control Status	**STATE Value**	**ERROR_NUMBER Value**
Control is not Communicating Properly	0x00	0x00
Control is Operating Correctly with No Errors	Not 0x00	0xFF
Control is Operating Correctly with Errors	Not 0x00	Not 0xFF

Table 6 describes the ERROR_NUMBER values for Lockout Errors. These are errors that require a manual reset to continue boiler operation. Table 7 describes the ERROR_NUMBER values for Blocking Errors. Blocking errors are conditions that allow the boiler to continue operation as soon as the condition is corrected.

Table 7 shows values for the WARNING_NUMBER holding register. These conditions primarily concern the operation of sensors.

If multiple errors are present, the lowest number error will be communicated.

Table 6A

ERROR_NUMBER (Lockout Errors)			
Error Number		**Error Designation**	**Description**
Decimal	**Hexadecimal**		
0	0x00	E2PROM_READ_ERROR	Internal Software Error
1	0x01	IGNIT_ERROR	3 Consecutive Failed Ignition Attempts
5	0x05	GV_RELAY_ERROR	Gas Valve Relay Problems
6	0x06	SAFETY_RELAY_ERROR	Internal Control Error
8	0x08	FAN_ERROR	Incorrect Fan Speed
9	0x09	RAM_ERROR	Internal Control Error
10	0x0A	WRONG_EEPROM_SIGNATURE	Internal Control Error
11	0x0B	RETURN_HIGHER_THEN_SUPPLY	Boiler Return Temp. Higher Than Supply
12	0x0C	E2PROM_ERROR	Internal Control Error
13	0x0D	STATE_ERROR	Internal Control Error
14	0x0E	ROM_ERROR	Internal Control Error
15	0x0F	AIR_SWITCH_NOT_OPEN	Internal Control Error
16	0x10	15MS_XRL_ERROR	Internal Control Error
17	0x11	AIR_SWITCH_NOT_CLOSED	Internal Control Error
18	0x12	T_MAX_LOCK_ERROR	High Temperature Limit Open
19	0x13	STACK_ERROR	Internal Control Error
20	0x14	FLAME_OUT_TOO_LATE_ERROR	False Flame Detected After Shutdown
21	0x15	FLAME_ERROR_1	False Flame Detected Before Ignition
22	0X16	20MS_XRL_ERROR	Internal Control Error
23	0X17	41MS_ERROR	Internal Control Error
24	0X18	TOO_MANY_FLAME_FAILURES	3 Consecutive Flame Failures
25	0X19	FLOW_SWITCH_NOT_CLOSED	Flow Switch Open / Circulator Off
26	0X1A	FLOW_SWITCH_NOT_OPEN	Flow Switch Closed / Circulator On
27	0X1B	FLAG_BYTE_INTEGRITY_ERROR	Internal Control Error
28	0X1C	AD_HI_CPL_ERROR	Internal Control Error
29	0X1D	AD_LO_CPL_ERROR	Internal Control Error
30	0X1E	REGISTER_ERROR	Internal Control Error

Table 6B

ERROR_NUMBER (Blocking Errors)			
Error Number		**Error Designation**	**Description**
Decimal	**Hexadecimal**		
31	0x1F	REFHI_TOO_LO_ERROR	Internal Software Error
32	0x20	REFHI_TOO_HI_ERROR	Internal Software Error
33	0x21	REFLO_TOO_LO_ERROR	Internal Software Error
34	0x22	REFLO_TOO_HI_ERROR	Internal Software Error
35	0x23	FLAME_ERROR_2	False Flame Detected
36	0x24	LOW_WATER_CUTOFF_ERROR	Low Water Cutoff
39	0x27	FLUE_GAS_ERROR	High Vent Temperature
40	0x28	RETURN_TEMP_ERROR	High Return Temp. (>194°F; >90°C)
41	0x29	BLOCKED_DRAIN_ERROR	Blocked Condensate Drain
43	0x2B	WD_50HZ_ERROR	Poor Ground Connection
44	0x2C	PHASE_ERROR	Hot & Neutral Legs Reversed
45	0x2D	NET_FREQ_ERROR	Frequency ≠ 60 Hz ± 1.2 Hz
46	0x2E	FAULTY_EARTH_ERROR	Poor Ground Connection
47	0x2F	WD_COMMUNICATION_ERROR	Internal Hardware Error
51	0X33	T_SUPPLY_OPEN	Supply Sensor Not Connected
52	0X34	T_RETURN_OPEN	Return Sensor Not Connected
55	0X37	T_DHW_OUT_OPEN	DHW Sensor Not Connected
56	0X38	T_SYSTEM_OPEN	System Sensor Not Connected
57	0X39	T_FLUE_OPEN	Flue Sensor Not Connected
59	0X3B	T_SUPPLY_SHORTED	Supply Sensor Shorted
60	0X3C	T_RETURN_SHORTED	Return Sensor Shorted
63	0X3F	T_DHW_OUT_ SHORTED	DHW Sensor Shorted
64	0X40	T_SYSTEM_ SHORTED	System Sensor Shorted
65	0X41	T_FLUE_ SHORTED	Flue Sensor Shorted
66	0X42	RESET_BUTTON_ERROR	Reset Button Activated 7 times in 1 min.

Table 7

WARNING_NUMBER			
Error Number		**Error Designation**	**Description**
Decimal	**Hexadecimal**		
1	0x01	T_OUTDOOR_SHORTED_WARNING	Outdoor Sensor Shorted
2	0x02	T_DHW_OUT_OPEN_WARNING	DHW Sensor Not Connected
3	0x03	T_ DHW_OUT_SHORTED_WARNING	DHW Sensor Shorted
4	0x04	FLUE_SENSOR_OPEN	Flue Sensor Not Connected
255	0xFF	NO_WARNING	All Sensors Operating Correctly

Table 8

Modbus Holding Registers (Read/Write)					
Item Index		**Parameter Name**	**Address & Holding Registers**		**Notes**
Word	**byte**		**Range Start 0x0000**	**Range Start 0x0001**	
10 High byte	10	R/W control	0x001A	0x001B	(°C+10)x 2 = byte value (°F−32)x$\frac{5}{9}$=°C
10 Low byte	11	R/W control	0x001A	0x001B	
14 High byte	14	NOT USED	0x001E	0x001F	
14 Low byte	15	DHW_SETPOINT	0x001E	0x001F	

3. **Modbus Holding Registers (Read/Write):** The 852-1 control has holding registers that allow DHW Setpoints to be written using Modbus commands. Table 8 shows the Modbus Holding Registers for Read/Write Control.

4. **Changing the DHW Setpoint:**
   a. Issue a Modbus write single holding register command that writes 0x0001 to the R/W control register located at 0x001A to switch the CH setpoint reading to writing.
   b. Calculate the scaled setpoint as follows: (°C+10) x 2 = scaled value
   c. Issue a Modbus Write single holding register command to write the scaled temperature setpoint value to the 0x001E holding register.

⚠ NOTICE

If no Modbus command is sensed for more than 4.25 seconds after the Write Command is issued, the control resets and the command must be re-issued to change the setpoint.

⚠ NOTICE

If an invalid value is written after the Write Command is issued, the control resets and the command must be re-issued to change the setpoint.

⚠ NOTICE

Modbus setpoints are maintained in volatile memory. Therefore, if the control must be reset due to an lockout error, a new value for DHW must be written through Modbus. If this is not done, the control will default to the last value saved for each of these parameters.

⚠ NOTICE

The Infinite Energy main control resets automatically every 24 hours. This will reset the CH and DHW setpoint values to the last value saved for each of these parameters. A new Modbus command should be issued periodically for each setpoint to be sure that the control is targeting the correct temperature.

⚠ NOTICE

If the setpoint is changed using the User Menu, Installer Menu, SiteVision Software or Analog Inputs (Infinite Energy DHW Mode 3), the Modbus setpoint will be overridden. Frequent updates are required to be sure that the control is targeting the correct temperature.Be sure to set the System Test parameter back to "Off" before leaving the installation. Otherwise, problems with cycling or insufficient heat may occur.

APPENDIX E. COMBUSTION TEST RECORD

Infinite Energy Combustion Test Record

Contact:			
Company Name:			
Address:			
Phone Number:			
Fax Number:			
Email Address:			
Jobsite Data			
Job Name:			
Jobsite Address:			
Boiler Data			
Boiler Model:		Boiler Serial No.:	
Manufacture Date:		Startup Date:	
Gas Pressure			
Static Inlet Gas Pressure (in. w.c.) [With Boiler Off]:		Inlet Gas Pressure Drop After Boiler Startup (in. w.c.):	
High Fire Outlet Gas Pressure (in. w.c.):		Low Fire Outlet Gas Pressure (in. w.c.):	
Combustion Readings			
Flame Signal High Fire (μA):		Flame Signal Low Fire (μA):	
CO_2 High Fire (%):		CO_2 Low Fire (%):	
CO High Fire (ppm):		CO Low Fire (ppm):	
Fan Speed High Fire:		Fan Speed Low Fire:	
Excess Air High Fire (%):		Excess Air Low Fire (%):	
Exhaust Temperature High Fire (°F):		Exhaust Temperature Low Fire (°F):	
System Information			
Water Pressure:		Condensate Line Size:	
Vent Length (Total Equivalent Feet):		Vent Diameter:	

LIMITED CONDENSING WATER HEATER WARRANTY

WHAT DOES THIS LIMITED WARRANTY COVER?

This limited warranty covers the Heat Exchanger for leakage, thermal shock or other malfunction caused by defects in materials and/or workmanship. It extends to the first buyer and to any subsequent owner(s) as long as the water heater remains installed at its original place of installation.

FIVE YEARS OF COVERAGE!

Model number and serial number are found on the rating plate affixed to the water heater. Heat exchangers are warranted against leakage and thermal shock for 5 years. Parts are warranted for 1 year. Any replacement heat exchanger under this warranty shall remain in warranty only for the unexpired portion of the original warranty.

WHAT DOES THIS LIMITED WARRANTY NOT COVER?

1. **This limited warranty does not cover leakage or other malfunction caused by:**
   a. Defective installation and specifically, any installation which is made:
      I) in violation of applicable state or local plumbing, housing or building codes, or
      II) without a certified American Gas Association, ASME, or comparable Temperature Pressure Relief Valve, or
      III) contrary to the written instructions furnished with the unit.
   b. Adverse local conditions and specifically, sediment or lime precipitate in the tubes and/or headers or corrosive elements in the atmosphere.
   c. Misuse and specifically, operation and maintenance contrary to the written instruction furnished with the unit, disconnection, alteration or addition of non-approved components or apparatus, operation with fuels or at settings other than those set forth on the rating plate, or accidental or other exterior damage.
2. This warranty also does not cover:
   a. Production of noise, odors, discoloration or rusty water.
   b. Damage to surrounding area or property caused by leakage or malfunction.
   c. All labor costs associated with the replacement and/or repair of the unit, including:
      I) examination and replacement of parts claimed to be defective
      II) any freight, shipping or delivery charges;
      III) any removal, installation or reinstallation charges;
      IV) any material and/or permits required for installation, reinstallation or repair;
      V) charges to return the water heater and/or components to the manufacturer.
   d. Any failed component of the water heater system not manufactured as part of the water heater.
   e. Any water heater altered without prior written approval from the manufacturer.
   f. Any damage or failure due to contaminated air, including, but not limited to, sheetrock particles, plasterboard particles, lint, dirt or dust, entering the water heater or any of its components.
   g. Any damage or failure due to chemically contaminated combustion air, including, but not limited to, chlorine gas, halogenated hydrocarbons, Freon, entering the water heater or any of its components.
   h. Any water heater that has been damaged as a result of natural disasters, including, but not limited to, lightning, fire, earthquake, hurricanes, tornadoes or floods.

WHAT WILL WE DO TO CORRECT PROBLEMS?

If a defect occurs within the warranty period we will:

1. Provide a comparable replacement manufacture, or at our option, repair any unit which develops a leak in the heat exchanger within the warranty period.
2. Provide a replacement part, or at our option, repair any part which fails to function within the parts warranty period. To obtain a replacement, you must return the defective part to our manufacturing facility. We reserve the right to verify any claims of defect by inspection.

CONDITIONS

We will not:

1. Repair or replace any water heater, or part, subject to conditions outlined in "What Does This Limited Warranty Not Cover?"
2. Reimburse any costs associated with repair and/or replacement.
3. Replace and/or repair any water heater without complete model number/serial number.
4. Replace any water heater without prior receipt of actual rating plate from the appliance.

HOW TO KEEP YOUR WARRANTY IN EFFECT?

To facilitate warranty service, you should:

1. Retain all bills of sale or receipts for proof of installation, etc.
2. Contact your installer or dealer as soon as any problem or defect is noticed.
3. When necessary, allow our representative to inspect the unit.
4. For your reference, fill in the Model and Serial Number found on the unit's Rating Plate:

Model Number _____

Serial Number _____

Date of Installation _____

260 North Elm Street
Westfield, MA 01085
Tel: (413) 568-9571
Fax: (413) 568-9613

7555 Tranmere Drive
Mississauga, ONT. L5S IL4 Canada
Tel: (905) 670-5888
Fax: (905) 670-5782

A MESTEK COMPANY

www.rbiwaterheaters.com